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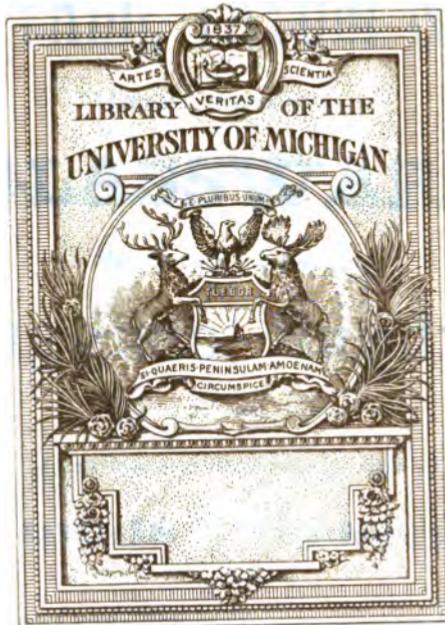
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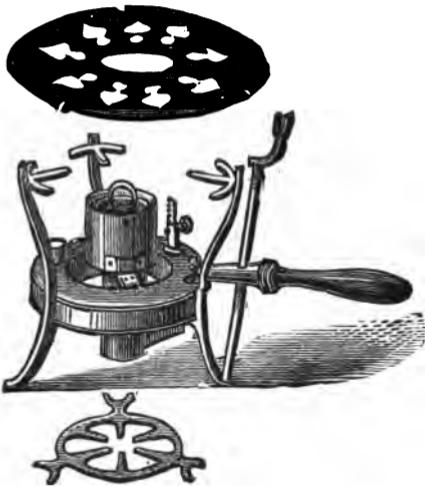
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LIST OF TESTS

(REAGENTS)

*Arranged in Alphabetical Order according to the
Names of the Originators.*

Designed especially for the convenient reference of
Chemists, Pharmacists and Scientists.

BY
HANS M. WILDER.

—
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PREFACE.

SHORTLY after the appearance of my translation of Schneider's LIST OF TESTS it was suggested to me that a collection of most—if not all—known tests would be greatly appreciated by chemists.

In preparing the present list of—chiefly qualitative—tests (953 under 870 distinct headings), I have subjected the following works to a thorough gleanings, so that I feel confident that no important test has been overlooked (if recorded at all in said volumes):

American Journal of Pharmacy, 1825 to 1888 inclusive.

Proceedings of the American Pharmaceutical Association, 1870 to 1888 inclusive.

Journal of the Chemical Society (London), 1878, 1879, 1882, 1888, inclusive.

Fresenius, *Zeitschrift für Analytische Chemie*, 1868 to 1877, 1880 1881, inclusive.

Prescott, *Proximate Organic Analysis* (1874).

Hager, *Pharmaceutische Praxis* (1876 to 1888).

Heppé, *Chemische Reactionen* (1875).

And sundry less widely known publications.

References to the six first-mentioned works have been introduced wherever deemed useful.

Some of the tests will be found to be identical; but having been recommended by several chemists, and hence being quoted variously, it has been considered inexpedient to omit them, so much the more as in many cases it is impossible to determine the priority.

It is, perhaps, needless to remark that, with very few exceptions, no single test—taken by itself—is conclusive (absolute), but only indicative.

This list might have been greatly extended by noticing every well-marked test of the single alkaloids. For these see under **ALKALOIDS.**

HANS M. WILDER.

PHILADELPHIA, April 25, 1885.

NOTE.—Unless distinctly stated otherwise, all acids are understood to mean "chemically pure" and "concentrated," and water to be "distilled."

SCHOOL OF MINES, COLUMBIA COLLEGE,
NEW YORK, May 1, 1885.

MY DEAR FRIEND: I have looked over the galley-proof of Mr. Wilder's List of Tests, and am very glad that he has taken the trouble to prepare so comprehensive a collection of special tests. It is a compilation which all chemists will be delighted to get, and for which they will be under great obligations to Mr. Wilder.

Very truly yours,

C. M. Chandler

To PROF. P. W. BEDFORD,
Editor of the Pharmaceutical Record.

PROF. A. B. PRESCOTT, of Ann Arbor,
Mich., says: "I congratulate you on bringing
out the 'List of Tests.' Besides immediate
usefulness, it is of no little service as an index
to literature of special analytical work."

LIST OF TESTS (REAGENTS).

ARRANGED IN ALPHABETICAL ORDER ACCORDING TO THE NAMES
OF THE ORIGINATORS.

1. **ADAMKIEWICZ** (albuminates and peptones).—Dissolve in excess of glacial acetic acid, and add sulphuric acid. A violet color and faint fluorescence.

2. **ALFRAISE** (iodine).—Add 1 drop of muriatic acid to 10 ccm. of (100 water, 1 starch, 1 nitrate of potassium, and boil). One drop of this test to a small quantity of the suspected liquid. Blue color.

3. **ALLEN** (carbolic acid).—I. Add to a few drops of muriatic acid 1 to 2 drops of the liquid and then 1 drop of nitric acid. Purple-crimson color.

II. See also *Am. Jour. Pharm.*, 1879, p. 28-36.

4. **ALLEN** (strychnia).—Extract with ether, and let it fall (drop onto drop) on to a warmed porcelain capsule (in this way concentrating into a small space); let cool, and test with sulphuric acid and peroxide of manganese. Violet color.

5. **ALMÉN** (blood).—Shake well tincture of guaiac with oil of turpentine so that an emulsion is formed, add cautiously thereto the liquid so that it at once sinks to the bottom, then shake gently. Blue color of the separated resin.

6. **ALMÉN** (albumen).—A 2-per-cent solution of tannin in diluted alcohol; add of this 1 part to 6 of the urine. Cloudiness.

7. **ALMÉN** (carbolic acid).—I. Dissolve 1 mercury in 1 nitric acid (1,40), and dilute with twice its bulk of water. Of this test add 5 to 10 drops to 20 ccm. of liquid, and heat to boiling. The yellow precipitate dissolves in nitric acid with a red color.

II. Add ammonia and a little solution of chlorinated soda. Blue color.

8. ANDERSON (papaverin).—To a solution of papaverin in diluted nitric acid add concentrated nitric acid. Dark red color, and separation of yellow crystals.

9. ANDRÉ (quinia).—Chlorine and ammonia. Green color, which turns blue on saturation with an acid; by excess of acid it becomes violet or bright red, which turns green on addition of ammonia.

10. ANDREASCH (iron).—Add a little ammonia and sulpho-glycolic acid to the liquid. A dark purplish-red color, which soon fades away, and is recalled on shaking with air.

11. ARNOLD (alkaloids).—I. Heat with a mixture of equal parts of sulphuric and carbolic acids. Color reactions.

II. Dissolve in syrupy phosphoric acid, and evaporate. Color reactions.

III. Treat with sulphuric acid, adding a crystal of nitrite of sodium. Color reactions. Add next a solution of potassa. Other colors.

IV. Treat with sulphuric acid, and add a little of alcoholic or aqueous solution of potassa. Color reactions.

12. AUSTEN AND CHAMBERLAIN (nitric acid).—Dissolve 200 grams ammonio-sulphate of iron in 1 litre water, and add 20 ccm. sulphuric acid (or: 13 grams ferrous sulphate, 6 sulphate of ammonium, 100 ccm. water, 2 ccm. sulphuric acid). Rose-red color.

13. BACH (solania).—Equal volumes of sulphuric acid and alcohol. Red color.

14. BACHMEIER (alkalies).—Solution of tannin. Red to reddish-brown color, turning into dirty green.

15. BACHMEIER (organic acids in carbolic acid).—An aqueous decoction of Brazil-wood is permanently discolored by organic acids, but not by carbolic acid.

16. BAEYER (eosin).—Shake with water and sodium-amalgam, heating gently; dilute with water, and add a drop of a solution of permanganate of potassium. Opaque green color in reflected light.

17. BAILEY (nitric acid).—Cyanhydrargyrate of iodide of potassium (1 equivalent each of cyanide of mercury and iodide of potassium). A small crystal introduced into nitric acid turns quite black (red in other acids).

18. BAILEY (sulphur).—Heat with carbonate of sodium, dis-

solve in water, and add a solution of nitroprusside of sodium. Blood-red color.

19. BARBIER (alcohol in essential oils).—Distil off about one tenth, and add to the distillate an excess of dry acetate of potassium. A dense solution will be formed.

20. BARBOT (purity of olive-oil).—Mix 2 grams fuming nitric acid with 20 grams oil. Consistence and color according to the oil.

21. BARBSCHÉ (glycerine).—Add to the liquid 20 volumes of water and 1 drop of carbolic acid. If now 1 drop of a solution of ferric chloride be added, a blue color will *not* be developed.

22. BARFOED (hydrocyanic acid in presence of a harmless cyanide).—Acidify with sulphuric or tartaric acid, and shake with ether, which takes up only hydrocyanic but not hydroferrocyanic acid; test further.

23. BARFOED (glucose).—Mix 200 ccm. of a solution of neutral acetate of copper (1:15) with 5 ccm. of 38-per-cent acetic acid. Add a few drops of this test to the suspected liquid, and boil up once. Red precipitate.

24. BARFOED (silicic acid).—Mix 1 part of the suspected substance with 2 of cryolith, and heat cautiously with 4 to 6 sulphuric acid in a platinum crucible, holding near to the surface of the melt a thick platinum wire, the loop of which contains a drop of water. A white pellicle of silicic acid hydrate is formed on the drop of water.

25. BARRESWIL (chromic acid).—Add to a very diluted, acidified, aqueous solution of peroxide of hydrogen a little ether and a few drops of solution of chromic acid. Blue color.

26. BARRESWIL (glucose).—Reduction on boiling the liquid with the following solution: 60 grams potassa and 40 neutral tartrate of potassium are dissolved in 200 ccm. water, and mixed with a solution of 65 sulphate of copper in 500 ccm. water.

27. BARRY (hydrocyanic acid).—Acidify slightly, if necessary, with acetic acid. Put 2 or 3 drops in a watch-glass, and cover with another glass containing 2 or 3 drops of solution of nitrate of silver (1:100). The drops get cloudy.

28. BECHAMPS (nitrobenzol in oil of bitter almonds).—Distil with acetate of iron, and test distillate with chlorinated lime. Blue color.

29. BECHI (purity of olive-oil).—A solution of 1 gram nitrate of

silver in 100 ccm. alcohol. Equal volumes oil and silver solution are shaken, and heated to boiling. Color reactions.

30. BEDSON (apomorphia in solution of morphia).—Boil with a little potassa. Brown color.

31. BEHRENS (purity of olive-oil).—A cold mixture of equal weights of sulphuric and nitric acids added to an equal weight of the oil. Yellow color.

32. BEILSTEIN (chlorine; bromine; iodine in organic substances).—Make a cupric oxide bead, dip it into the suspected substance, and heat in the lower part of a Bunsen flame. Green or blue color.

33. BELLAMY (copper; iron).—Add an alcoholic tincture of log-wood. Blue color.

34. BENEDIKT (colors).—Resorcinol dyes. See table in *Journal Chem. Soc.*, 1873, p. 690, or *Chem. News*, xlvi, p. 109.

35. BERGMAN (free mineral acids in wine and vinegar).—To 5 ccm. add 5 drops normal solution of oxalate of ammonium and 5 drops normal solution of sulphate of calcium. A precipitate of oxalate of calcium will *not* be formed.

36. BERNOUILLY (alcohol in essential oils).—Add dry acetate of potassium. A dense solution will be formed.

37. BERTHELOT (alcohol).—Add chloride of benzoyl. Formation of benzoic ether, with its characteristic odor.

38. BERTHOLD (textile fibres).—A solution of iodine in sulphuric acid. See scheme in *Am. Jour. Pharm.*, 1884, p. 222, or *Pharm. Journal and Trans.*, January, 1884, p. 587.

39. BERTONI AND RAYMONDI (nitrous acid in blood).—Dialyse, and evaporate dialysate to dryness. Take up with hot alcohol, and test with starch paste and iodide of potassium in the usual way.

40. BERZELIUS (arsenic).—Heat in a test-tube with a piece of charcoal. Mirror and alliaceous odor.

41. BERZELIUS (purity of musk).—An aqueous infusion does not precipitate a solution of corrosive sublimate.

42. BETELLI (fusel-oil in alcohol).—Add 5 ccm. alcohol, 6 ccm. water, 15 drops chloroform; shake well. The separated chloroform contains the fusel-oil. Let evaporate, and apply the usual tests.

43. BETTENDORFF (arsenic).—Mix a strongly acid solution of stannous chloride (in muriatic acid) with a little sulphuric acid. Brown cloudiness.

44. BIBANOW (colors).—Anilin. Scheme, see Fresenius, *Zeitschrift f. Analyt. Chem.* 1875, p. 106-116.

45. BIEBER (fixed oils).—Equal weights of sulphuric acid, fuming nitric acid, and water. Mix 5 volumes oil with 1 volume of test. Color reactions. See "Proceedings Am. Pharm. Association," xxvi, (1878), p. 499.

46. BIEL (benzine; benzol).—Behavior to iodine (color); alcohol (solubility); asphaltum (solubility); nitric acid (nitrobenzol); spec. gravity.

47. BILL (bromides).—Add 1 drop muriatic acid and then 1 drop chloride of gold solution. Yellow to dark orange-red color.

48. BILTZ (iodic acid in nitric acid).—Dilute the nitric acid with an equal volume of water, add a few drops of starch solution and a few drops of sulphuretted hydrogen water. Blue color.

49. BILTZ (monocarbonate in bicarbonate of sodium).—Add a solution of 2 parts of the bicarbonate in 30 water to 5 of a solution of 1 corrosive sublimate in 20 water. If pure, only a white cloudiness. Brownish-red precipitate in presence of monocarbonate.

50. BLACHEZ (alcohol in chloroform).—Add a small piece of potassa, agitate, pour off the chloroform after five minutes, and shake it with an equal volume of water. Pour off the water, and add to it a solution of sulphate of copper. A precipitate indicates alcohol.

51. BLOXAM (alkaloids). Dissolve in diluted muriatic acid, and add bromine water drop by drop. Color reactions.

52. BLYTH (alkaloids).—Sublimating point. See "Proceedings Am. Pharm. Association," xxvii, (1879) p. 482.

53. BLYTH (lead in potable water).—Add 1 p. c. of alcoholic tincture of cochineal. Precipitate.

54. BOBIERRE (lead in tin).—Apply a drop of glacial acetic acid; heat; after cooling apply a drop of a 5-per-cent solution of iodide of potassium. Yellow stain.

55. BOEDEKER (albumen).—Precipitates by solution of ferrocyanide of potassium in presence of acetic acid.

56. BOEDEKER (sulphurous acid).—The liquid must be neutral.

I. Add a solution of sulphate of zinc with a little nitroprusside of sodium. Rose to dark-red color.

II. Add a solution of ferrocyanide of potassium. Purple precipitate.

57. BOETTGER (alcohol).—Add a solution of molybdic acid in sulphuric acid. Blue color.

58. BOETTGER (alkalimetry).—Alcoholic tincture of the petals of Coleus Verschaffelti. Alkalies turn the red color to green.

59. BOETTGER (gaseous ammonia).—Expose to the gas a strip of alcannin paper. Red color turns blue.

60. BOETTGER (ergot in rye flour).—Heat for several minutes with an equal bulk of ether and a few crystals of oxalic acid. Reddish color.

61. BOETTGER (glucose).—Heat the liquid with a solution of sodium carbonate in presence of subnitrate or hydrated oxide of bismuth. Gray or blackish bismuthous oxide.

62. BOETTGER (water in ether).—Agitate gently with an equal bulk of bisulphide of carbon. Milkiness.

63. BOETTGER (flour in starch).—Heat 1 gram starch with 180 c.c. water to boiling, stirring briskly with a glass rod. A more or less persistent foam indicates flour.

64. BOETTGER (manganese).—Fuse a little chlorate of potassium, and throw into it a fragment of the substance. Red coloration.

65. BOETTGER (nitric acid in potable water). Mix 3 drops of water, 2 drops solution of brucia, and 3 to 4 drops sulphuric acid. Red to brownish-red color.

66. BOETTGER (nitrous acid).—Add diluted sulphuric acid and iodide of cadmium-starch paste. Blue color.

67. BOETTGER (alcohol in essential oils).—I. Shake with glycerine, which dissolves the alcohol and diminishes the bulk of oil.
II. Add a piece of dry potassa. It soon gets covered with a yellowish film.

68. BOETTGER (ozone).—I. A strip of filtering-paper moistened with an acid free solution of chloride of gold. Violet color.
II. A strip of filtering-paper dipped into a solution of protoxide of thallium (precipitate a solution of sulphite of thallium with baryta water) and dried. Brown color.

69. BOETTGER (peroxide of hydrogen).—I. Addition of iodide of cadmium-starch paste and very little protosulphate of iron. Deep ultramarine-blue color.
II. Heat liquid with a few drops of ammoniacal solution of nitrate of silver (which does not contain free ammonia). Cloudiness and reduction of silver.

70. BOETTGER (safranine).—Sulphuric acid turns it blue, and water superadded green.

71. BOETTGER (rhodanates=sulphocyanides).—Dip a strip of filtering-paper in tincture of guaiac, let dry, and moisten it with a very dilute solution of sulphate of copper (1:2000). Place on it a drop of the suspected liquid. Blue color.

72. BOHLIG (ammonia).—I. Solution of corrosive sublimate (1:30) shows free ammonia and carbonate of ammonium.

II. Solution of carbonate of potassium (1:50) shows ammonium salts (1:200,000).

73. BOLAS (nitric acid).—Mix 10 sulphuric acid with 1 solution of ferrous sulphate, and heat; pour the suspected liquid cautiously on top. Brown zone.

74. BONASTRE (myrrh).—Violet color on adding nitric acid to a strip of filtering-paper, moistened with tincture of myrrh.

75. BORNTRAEGER (aloes).—Take up with benzine, separate from the liquid, add stronger ammonia, and heat. Red color.

76. BORNTRAEGER (alkalimetry).—A concentrated tincture of fresh orange-peel; shake up with ether. Colorless with acids; lemon-yellow with alkalies.

77. BORSARELLI (alcohol in essential oils).—Add dry chloride of calcium, and heat. A dense solution is formed.

78. BOUCHARDAT (cinchona alkaloids).—Distinguished by their action on the polarized light. See *Am. Jour. Pharm.*, xxx, (1858) p. 241, 242.

79. BOUCHARDAT (alkaloids).—Iodo-iodide of potassium (10 iodine, 20 iodide of potassium, 500 water). Brown precipitate.

80. BOUDET (purity of olive-oil).—I. Add 3 parts of (equal volumes of sulphuric and nitric acids) to 10 parts oil; shake well. Color reaction.

II. Nitric acid containing hyponitric acid. Consistence.

81. BOURGOIN (nitrobenzol in oil of bitter almonds).—Shake 15 drops oil with 8 drops solution of potassa. Green color. Now add 20 drops water: two layers are formed—the upper one green, the lower yellow.

82. BOUSSINGAULT (nitric acid).—Acidify with muriatic acid, and add a drop of indigo solution. Decolorization.

83. BOUVIER (fusel-oil in alcohol).—Add a few crystals of iodide of potassium, and agitate gently. In a few minutes a distinct yellowish color.

84. BRACONNOT (arsenic).—Extract with alcohol, and test with sulphuretted hydrogen.

85. BRADFORD (purity of olive-oil).—Shake the oil with a solution of subacetate of lead. Redish color indicates cottonseed-oil.

86. BRANDBERG (benzol; benzine).—Pitch dissolves in benzol, but not in benzin.

87. BRANDES (quinia).—Green color on treating with chlorine water and ammonia.

88. BRAUN (nitric acid).—To 1 ccm. of sulphuric acid add drop by drop 0.5 ccm. of a solution of sulphate of aniline (10 drops aniline, 50 ccm. diluted sulphuric acid); dip a glass rod in the liquid to be examined, and draw through the test (dropped on a porcelain plate); then breathe on the surface, which quickly fringes red.

89. BRAUN (chlorates).—Add a solution of sulphate of aniline (containing toluidin) and muriatic acid. Cherry-red; on neutralizing turns blue.

90. BRAUN (molybdic acid).—Add to a very dilute solution of molybdic acid containing a little nitric acid an aqueous solution of xanthogenate (ethylsulphocarbonate) of potassium. A yellow to flesh-colored precipitate, soon turning violet.

91. BRAUN (glucose).—A solution of glucose, heated to 90° C. in presence of a little of a solution of soda, mixed with a solution of picric acid, boiling finally. Blood-red color.

92. BRAUN (nickel).—Add a solution of sulphocarbonate of potassium. Rose-red to deep brownish-red color, almost black.

93. BRAUTLECHT (organic impurities in potable water). Treat 100 ccm. with 5 drops of (1 aluminium sulphate, 1 muriatic acid, 8 water), and add 1 to 2 drops ammonia. Filter off the precipitate, redissolve it in 10 to 15 drops diluted acetic acid, and examine under the microscope before and after the addition of safranine.

94. BRIEGER (strychnia).—Pure chromic acid. Violet color.

95. BROUARDEL AND BOUTMY (ptomaines from plant alkaloids).—Blue coloration on applying ferricyanide (red) of potassium and afterwards ferric chloride.

96. BRUECKE (biliary matter).—Add to the urine nitric acid, shake, and let flow on to the bottom of the test-tube sulphuric acid. Color reactions.

97. BRUECKE (glucose). Boil freshly precipitated, still moist subnitrate of bismuth—obtained from 5½ metallic bismuth—with

80 potassium iodide and 150 water. After 10 minutes add 5 twenty-five-per-cent muriatic acid. Reduction.

98. BRUECKE (urea).—Heat the alcoholic extract with a little fusel-oil, filter, and add a solution of oxalic acid in fusel-oil. Crystalline deposit.

99. BRUNNER (glucosides).—Pettenkofer's test for bile. Red color.

100. BRUNNER (nitrobenzol).—Add solution of potassa, alcohol, and a little sulphur. Red color.

101. BRUNNER (picric acid).—Suspend a woollen thread in the liquid, rinse it lightly in water, and extract with ammonia. Solution of cyanide of potassium colors it red.

102. BRUNNER (sulphur).—Mix with a solution of potassa, add a few drops nitrobenzol and alcohol. Reddish to red color.

103. BUCHHEISTER (purity of olive-oil).—Equal parts of nitric and sulphuric acids. Color reactions.

104. BUCHNER (purity of jalap and scammony resin).—Dissolve in diluted solution of potassa or soda, heat and filter. Diluted sulphuric acid in excess must not produce a precipitate, and but a slight opalescence.

105. BUCKINGHAM (alkaloids).—A freshly-prepared solution of 8 grains molybdate of ammonium in 2 drams sulphuric acid, and heating the milky solution till clear. Color reactions. See "Proceedings Am. Pharm. Association," xxi (1873), p. 369.

106. BUNSEN (phosphoric acid in minerals).—Fuse with sodium and moisten with water. Formation of phosphuretted hydrogen.

107. CADET (arsenic).—Heat with acetate of sodium. Formation of kakodyl (characteristic odor).

108. CAILLETET (copper in olive-oil).—Add to 10 ccm. of "Malaga" oil a solution of 0.1 pyrogallic acid in 5 ccm. ether, and shake. Brown color or precipitate.

109. CAILLETET (tartaric and citric acids).—Treat with a solution of bichromate of potassium. Tartaric acid—a deep purplish-violet color (almost black). Citric acid—coffee-brown.

110. CAILLIAN (glucose).—Shake 2 volumes of the urine well with 1 chloroform, and let stand; the upper layer contains all the glucose. Test as usual.

111. CALVERT (fixed oils).—I. Shake 5 volumes oil with 1 nitric acid (1,180), and set aside for five minutes. Color reactions.

II. Use in the same way acids of respectively (1,220) and

(1,330). Colors. To the mixture with the last strength of acid add afterwards an excess of soda solution (1,33). Color reactions.

III. Use in the same way sulphuric acids of respectively (1,475), (1,530), (1,635), setting aside for ten minutes. Color reactions.

IV. Shake 5 volumes oil with 1 of a mixture of equal volumes of sulphuric acid (1,840) and nitric acid (1,330), setting aside for ten minutes.

V. Use in the same way syrupy phosphoric acid.

VI. Use in the same way nitro-muriatic acid (1 volume nitric acid of 1,330, and 25 volumes muriatic acid). Afterwards add to this oil-acid mixture excess of soda solution (1,33), and note also the colors.

VII. Use in the same way to 5 volumes oil (1 volume water, 1 nitric acid, 1 sulphuric acid). Colors.

VIII. Mix 4 volumes oil with 1 of soda solution (1,33), and heat to boiling. Colors. See scheme: Prescott, *Org. Analysis* (1874), p. 80.

112. CAMPANI (copper).—Mix a solution of glucose with a solution of subacetate of lead. Yellow to orange-red precipitate.

113. CAMPANI (glucose).—Add a mixture of a concentrated solution of subacetate of lead with a dilute solution of acetate of copper. Yellow to orange red precipitate.

114. CAMPANI (manganese in ashes).—Exhaust the ashes with hot water, and boil them with a mixture of 85 volumes nitric acid and 15 phosphoric acid. Evaporate the clear liquid to dryness, take up with muriatic acid, and evaporate again to dryness. Amethyst color.

115. CAPPAZUOLI (glucose). A solution of hydrated oxide of copper in potassa. Blue color.

116. CAREY LEA (gelatine).—An acid solution of nitrate of mercury. Red color.

117. CAREY LEA (hydrocyanic acid).—1 ammonio-sulphate of iron, 1 nitrate of uranium, 240 water. Add 2 drops of the suspected liquid on a porcelain slab to 2 drops of the test solution, so that the two liquids only touch each other. Purplish-red color or precipitate.

118. CAREY LEA (iodine). Add starch paste to the liquid, stir well, then add a drop of a diluted solution of bichromate of potassium and a few drops of muriatic acid. Bluish to blue color.

119. CAREY LEA (hyposulphites).—Boil the liquid with a few drops of a solution of chloride of ruthenium in presence of ammonia. Rose-red to scarlet color (1 : 25000).

120. CARPENÉ (tannin in wines).—Add a saturated solution of acetate of zinc in 5-per-cent ammonia in excess to the wine. Precipitate.

121. CASALI (biliary matter).—Precipitate the urine with solution of acetate of lead and ammonia, and extract with ether and muriatic acid. Let the ethereal layer evaporate, and test with oxidizing agents. Yellow, red, violet, blue color.

122. CASAMAJOR (glucose).—Methylic alcohol. Cloudiness.

123. CASSORIA (water in absolute alcohol).—Poured over dehydrated sulphate of copper turns the latter blue.

124. CAZENEUVE AND COTTON (methylic in ethylic alcohol).—Mix 10 ccm. of the alcohol with 1 ccm. of a dilute solution of permanganate of potassium (1:1000). Instant reduction; ethylic alcohol reduces only very gradually.

125. CHANCEL (fuchsine in wine).—Treat 10 ccm. wine with 3 ccm. solution of subacetate of lead (— 1 : 20), heat and filter. If the filtrate is still red, acidify with acetic acid, and take up the color with fusel-oil; test it.

126. CHAPMAN AND SMITH (tartaric and citric acids).—Heat to boiling with a strongly alkaline solution of permanganate of potassium. Tartaric acid reduces it at once; with citric acid the green color remains.

127. CHATARD (nitrous acid).—Evaporate nearly to dryness, and rub with a few drops solution of sulphate of aniline. A distinct odor of carbolic acid.

128. CHATIN AND GAULTIER DE CLAUBRY (iodine).—A mixture of 1 volume nitric acid, 6 sulphuric acid and starch. Blue to violet color.

129. CHEVREUL (ammonia).—Hæmatoxylin paper. Red color turns violet.

130. CHIAPPE (mineral acids in vinegar).—Methylaniline-violet. Changes to ultramarine blue.

131. CLARK (creasote; carbolic acid).—Boil with excess of nitric acid till red fumes are no longer evolved, and neutralize with potassa. Creasote causes no crystalline precipitate; carbolic acid, yellow crystals.

132. CLAUS (water in absolute alcohol).—Anthrachinon and

sodium amalgam are moistened with the alcohol. Red color. Absolute alcohol causes a green color.

133. CODINA Y LAENGLIN (purity of olive-oil).—Mix 8 volumes nitric acid (1,33) and 1 water. Add 1 gram of this test to 8 grams oil, and heat in water-bath. Color reactions.

134. CONROY (purity of olive-oil).—Mix 9 volumes oil with 1 nitric acid (1,42), and heat. Color and consistence according to oil.

135. CORNE (iodates in iodides).—Phosphorated water (= water in which phosphorus has been kept) in presence of starch paste. Blue color.

136. COTTON (brucia).—Add an excess of a solution of sodium sulphhydrate to a warm solution of brucia in nitric acid. Violet to green coloration.

137. COUPERRE (narcotia).—Heat with sulphuric acid. Blood-red color.

138. CRESTI (copper).—Place into the liquid a zinc-platinum element, formed of two thin wires. Remove the platinum wire, rinse with water, and expose for a moment to the action of hydrobromic acid and bromine vapors (= heat bromide of potassium with sulphuric acid). Violet color of deposit.

139. CREUSE (salicine in sulphate of quinia).—Diluted sulphuric acid and bichromate of potassium.

140. CROOK (purity of butter).—Melt 10 grains in a test-tube in a water-bath, add 30 minimis carbolic acid (Calvert's No. 2; 1 pound and 2 fl. ozs. water), shake and warm till clear. After standing, pure butter yields a clear liquid; most other fats, two layers.

141. CUNISSET (biliary matter).—Shake the urine with chloroform, which assumes a yellow color.

142. CURTMAN (potassium salts).—Add to a solution of a potassium salt a solution of 1 nitrate of cobalt in 10 parts of a saturated solution of nitrite of sodium, slightly acidified with acetic acid. Yellow precipitate.

143. CZUMPELITZ (alkaloids).—A solution of 1 gram chloride of zinc in 30 ccm. muriatic acid and 30 ccm. water. Color reactions.

144. DARTON (gold).—Reduce the ore to a fine powder, put in a test tube partly filled with an aqueous solution of iodine (20 grains iodine, 30 iodide of potassium in 1½ fl. ozs. water), shake

well, and dip into the solution a strip of filtering-paper. Dry the paper, and heat it on a platinum foil to redness. After cooling it assumes a purple color.

145. DAVY (alcohol).—A solution of 1 molybdic acid in 2 sulphuric acid. (Essential oils are first shaken with water, which is separated; urine is distilled.) Blue color.

146. DAVY (arsenic).—*Marsh's* method, substituting the diluted sulphuric acid with an amalgam of mercury and sodium. Evolution of arseniuretted hydrogen.

147. DAVY (carbolic acid).—Add 3 to 4 drops of (1 molybdic acid in 10 sulphuric acid) to 1 or 2 drops of the liquid. Dark olive-green to blue and violet color.

148. DAVY (manganese).—I. Add a few drops solution of potassa to the substance, and heat to redness on a silver foil. Green color.

II. Heat a mixture of the substance and sulphur to redness on a platinum foil, dissolve in water, and add ferrocyanide of iron. White precipitate.

149. DAVY (strychnia).—Sulphuric acid, adding afterwards powdered (red) ferricyanide of potassium. Deep violet color.

150. DAY (pus, matter).—Blue coloration on addition of 1 or 2 drops oxidized tincture of guaiacum to the urine.

151. DEBRUNNER (nitrobenzol in alcoholic beverages).—Take up with ether, separate, and add a few drops dilute acetic acid, a little very fine iron-filings, and sufficient water. As soon as the oil-drops have disappeared, decant. Treat with soda, take up with ether, evaporate, and add a few drops muriatic acid and a little chlorate of potassium. Blue to green color.

152. DEBRUNNER (water in absolute alcohol).—Permanganate of potassium is insoluble in absolute alcohol. A purple coloration, therefore, indicates water.

153. VAN DEEN (blood).—Blue color on adding a few drops of freshly prepared tincture of guaiac and ozonized oil of turpentine to the very dilute (almost colorless) liquid.

154. DEGENER (alkalimetry).—Phenacetolin (the brown substance obtained by heating for several hours 1 equivalent each of carbolic, sulphuric, and glacial acetic acids). Alkalies turn it red.

155. DELFFS (alkaloids).—Platino-cyanide of potassium. Formation of platino-cyanides.

156. DELFERS (caffeine).—Add a solution of red oxide of mercury in iodide of potassium. Crystalline precipitate. (The other alkaloids yield amorphous precipitates.)

Desbassins—see *Richmont*.

157. DIESEL (purity of olive-oil).—Nitric acid. Color reactions.

158. DONATH (free acids).—Add a little iodide and bichromate of potassium, and several ccm. of bisulphide of carbon. Violet color of the latter.

159. DONATH (free sulphuric acid in vinegar).—Boil with chromate of lead, filter, add iodide of potassium and bisulphide of carbon. Violet color of the latter.

160. DONATH (chromate in presence of bichromate of potassium).—Bring the liquid to a boil, and add a drop of a not too strong solution of sulphate of manganese. A heavy blackish-brown precipitate.

161. DONATH (bichromate in presence of chromate of potassium).—Bring a solution of hyposulphite of sodium to a boil, and add an equal volume of the previously heated liquid. Brown cloudiness or precipitate.

162. DONATH (free chromic acid in presence of bichromate).—Add a solution of iodide of potassium, shake, and add bisulphide of carbon. Violet color of the latter.

163. DONATH (resin in wax).—Heat with 4 to 5 times as much crude nitric acid (1,88) to boiling for about one minute, add an equal volume cold water and an excess of ammonia. If pure, the alkaline solution has a yellow color; presence of resin turns it reddish brown.

164. DONATH (tar matter in ammonia).—Supersaturate with sulphuric acid, and add a solution of permanganate of potassium. Reduction.

165. DONATH AND MAYRHOFER (glycerine).—Evaporate to dryness, and heat carefully up to 120° C. with a couple of drops of carbolic and sulphuric acids. Extract with water, and add to the residue ammonia. Carmine-red color.

166. DRAGENDORFF (alkaloids).—I. Dissolve bismuthic iodide in a warm concentrated solution of potassium iodide, and add an equal bulk of the latter solution. Reddish-brown precipitates.

II. Scheme for separation by petroleum naphtha, benzol, chloroform, fusel-oil, acidulated water. See Prescott, *Organ. Analysis* (1874), p. 184-186.

167. DRAGENDORFF (benzine; benzol).—Action of fuming nitric acid. Formation of nitrobenzol when benzol is present.

168. DRAGENDORFF (bitter substances).—Scheme, see "Proceedings Am. Pharm. Association," xxx, (1882) p. 388.

169. DRAGENDORFF (brucia).—Dissolve in a mixture of 1 volume sulphuric acid and 9 water, and add with a glass rod a small quantity of a very dilute solution of bichromate of potassium. Raspberry-red to brownish-orange color.

170. DRAGENDORFF (carbolic acid in urine).—Take up with petroleum naphtha, and test as usual.

171. DRAGENDORFF (narceina).—Potassio-iodide of zinc. Blue color.

172. DRAGENDORFF (nitrobenzol in bitter oil of almonds).—To 10 drops oil add 4 of alcohol and a trace of sodium. Deep brown and viscid.

173. DRAGENDORFF (solania).—Dissolve in hot fusel-oil. It forms a firm jelly (even as little as 1:2000).

174. DRAGENDORFF (strychnia).—Iodic acid. Red to reddish-brown color.

175. DRAGENDORFF (blood).—See *Journal Chem. Soc.*, 1882, p. 561, or *Pharm. Journal and Trans.* [3] xii, p. 586.

176. DRAGENDORFF (alcohol in essential oils).—Add a piece of sodium. Evolution of gas; cloudiness; brown color. See Prescott, *Organ. Analysis* (1874), p. 114.

177. DRAGENDORFF (oil of turpentine in essential oils).—Add alcohol. Turbid solution.

178. DRAGENDORFF (essential oils).—I. Action of sodium. See Prescott, *Organ. Analysis* (1874), p. 114.
II. Add to 1 drop oil 10 drops of (1 bromine in 20 chloroform). Color reactions. See Hager, *Praxis*, iii. p. 796-7.

179. DRAGENDORFF AND Kossow (essential oils).—Action of ferric chloride and sulphuric acid; chloroform, ferric chloride, and sulphuric acid; chloroform and sulphuric acid. Scheme, see "Proceedings Am. Pharm. Association," xxvi, (1878) p. 433.

180. DRAPER (castor-oil in essential oils).—Evaporate 20 drops as far as possible in a porcelain capsule, and add 5 to 6 drops nitric acid. After finished reaction add a solution of carbonate of sodium. Odor of cantharic acid.

181. DRECHSEL (biliary matter).—Add to the concentrated

liquid, syrupy phosphoric acid, a little cane-sugar, and heat in a water-bath. Red to reddish-brown color.

183. DRECHSLER (alcohol in essential oils).—Add 3 drops of (1 bichromate of potassium in 10 nitric acid of 1,30) to 5 drops oil. Coloration.

183. DRYER (tin).—Dissolve 0.1 gram brucia in 1 ccm. nitric acid, and add 50 ccm. water; heat to boiling, and let cool. Add a few drops of this test to the liquid. Purple coloration (shows 0.00002 gram stannous chloride in a drop).

184. DUDLEY (gallic acid).—Add a solution of picrate of ammonium (or add to a solution of picric acid ammonia in excess). Reddish color, changing to green.

185. DUDLEY (glucose).—Nitrate of bismuth, dissolved in a little nitric acid, add an equal bulk of acetic acid, and dilute to 10 volumes with water. Add of this test 1 or 2 drops to the urine (rendered strongly alkaline by solution of soda), and boil. Gray or black precipitate.

186. DUFLOS (aniline).—Green coloration with sulphuric acid and peroxide of lead.

187. DUFLOS (picrotoxin).—Add a solution of bichromate of potassium. Green color.

188. DUPASQUIER (organic matter in water).—Aqueous solution of chloride of gold.

189. DWARS (cinchona alkaloids).—Dissolve in alcohol, add 1 drop of diluted sulphuric acid, and then tincture of iodine, drop by drop. Precipitate as iodosulphates (different appearance).

190. EBOLI (alkaloids).—Diluted (1:1) sulphuric acid and bichromate of potassium. Color reactions. See *Am. Journal Pharm.*, xxix, (1857) p. 369.

191. EINBRODT (ammonia).—To 100 ccm. of the water add 1 drop solution of muriate of ammonium, 1 drop solution of potassa, and 1 drop solution of corrosive sublimate. White opalescence.

192. ENDEMANN AND PROCHAZKA (copper).—To 1 drop of the liquid add 1 drop hydrobromic acid, and let evaporate slowly. Rose-red to reddish-brown (almost blackish) color.

193. ERDMANN (alkaloids).—Mix 10 drops of nitric acid with 20 ccm. water (according to others: 6 drops to 100 ccm.), and take of this 10 drops to 20 ccm. sulphuric acid. Color reactions. See *Hager, Pharm. Praxis*, i. p. 207-210.

194. ERDMANN AND USLAR (alkaloids).—Extract with water containing muriatic acid; mix with sand, use ammonia, then fusel-oil. See Prescott, *Organ. Analysis* (1874), p. 133, or *Am. Journal Pharm.*, xxxiv, (1862) p. 354.

195. ESCHKA (mercury).—Heat the substance in a crucible, and condense the vapors on a cold gold plate (as lid). White stain.

196. EVERITT (opium).—Addition of solution of ferric chloride causes a red color, which is not acted upon by a solution of corrosive sublimate. (Sulphocyanide of iron is bleached by sublimate).

197. EYCKMANN (carbolic acid).—Add to 1 ccm. of the liquid 1 to 3 drops sweet spirit of nitre and an equal volume of sulphuric acid. Red color. (Salicylic acid and albumen show the same color, but not so intense.)

198. EYCKMANN (thymol in menthol).—Dissolve the menthol in 1 ccm. glacial acetic acid, and add 5 to 6 drops sulphuric acid. Addition of 1 drop of nitric acid produces a blue color.

199. FAIRTHORNE (chloral).—Heat with a concentrated solution of bichromate of potassium, then add nitric acid. Blue color.

200. FAIRTHORNE (morphia).—Add solution of chlorinated soda, then ammonia. Dark red color.

201. FEHLING (glucose).—34,65 or 34,639 grams sulphate of copper dissolved in 200 ccm. water, then mixed with a cold solution of 150 (or 173) potassium tartrate in 500–600 ccm. solution of caustic soda (1.14), and diluted with water to 1 litre. 10 ccm. = 0,05 glucose. Reduction.

202. FENTON (tartaric acid).—Add a little solution of ferrous chloride or ferrous sulphate, 1 or 2 drops of peroxide of hydrogen, and lastly an excess of free alkali. Violet color.

203. FIELD (bismuth).—When the least trace of bismuth is present in a solution of a lead salt, addition of solution of iodide of potassium precipitates the lead (as iodide) not in yellow, but in orange-red or crimson scales.

204. FILHOL (alkalies).—Solution of nitroprusside of sodium in presence of sulphuretted hydrogen. Blue color.

205. FILHOL (iodine).—Extract in any convenient manner, evaporate to dryness with potassa, take up with alcohol, evaporate, dissolve in water, add a few drops of muriatic acid, then chromic acid and bisulphide of carbon. Violet color of the latter.

206. FINKEH (chrysammic acid).—Add a warm solution of cyanide of potassium, carbonate of potassium in excess, and water. Violet-red color.

207. FISCHER (selenium).—A solution of selenious acid, mixed with sulphuric acid, applied to silver causes a yellow to brown spot.

208. FISCHER (platinum).—A solution of chloride of platinum in muriatic acid is colored red by a solution of stannous chloride.

209. FISCHER (sulphuretted hydrogen).—Add to 50 ccm. of the liquid 1 ccm. muriatic acid, then add a few grains of sulphate of paramido-dimethylamine, and 1 to 2 drops of a dilute solution of ferric chloride. Blue color. (Shows 0.00005 gram in a litre.)

210. FITTIG (alkalimetry).—An ethereal solution of mesityl-chinon is yellow; alkalies turn it to a violet color.

211. FLEISCHMANN (alcohol in essential oils and in chloroform).—Shake well with water, evaporate the aqueous liquid, and treat with a solution of bichromate of potassium, adding an excess of sulphuric acid. Green color.

212. FLEITMANN (arsenic).—*Marsh's* method, substituting for the diluted acid a strong solution of potassa or soda. The evolved arseniuretted hydrogen produces a black stain on nitrate of silver paper.

213. FLUECKIGER (free mineral acids).—A drop of a violet-colored mixture of (ferrous sulphate, gallic acid, and acetate of sodium) is discolored.

214. FLUECKIGER (brucia).—An aqueous solution mixed with a solution of mercurous nitrate (free from excess of acid) is heated. Crimson color.

215. FLUECKIGER (carbolic acid in oil of cloves).—Shake 1 volume oil with 50 hot water, let cool, decant, and concentrate by evaporation. Add a drop of ammonia, and sprinkle a little chlorinated lime on top. Green to blue color.

216. FLUECKIGER (colchicia).—A very dilute, almost colorless, solution is colored yellow by sulphuric acid, and bluish violet by nitric acid.

217. FLUECKIGER (creasote; carbolic acid).—I. Mix 1 volume of solution of chloride of iron (1,34) with 9 creasote, and add 5 85-per cent alcohol: green color. Add now 60 water: cloudy brownish color. Carbolic acid substituted for creasote (or present in not too small quantity) is indicated by a brown color with alcohol (as above), and a blue color on adding water.

II. Add one-fourth volume ammonia, and expose to vapors of bromine. Blue color indicates carbolic acid. A brown or dirty green shows creasote.

218. FLUECKIGER (curarine).—Precipitate with bichromate of potassium, and add to the dried precipitate sulphuric acid. Dark-blue color.

219. FLUECKIGER (digitalin).—Chloral-alcoholate dissolves it with a yellowish-green color, which on heating turns violet, then blackish green.

220. FLUECKIGER (euphorbium).—Extract with ether, evaporate, and add sulphuric acid. Yellowish-brown color, which on addition of nitric acid turns violet.

221. FLUECKIGER (gallic acid).—Add a freshly made solution of 1 ferrous sulphate in 100 water. The colorless mixture turns violet on addition of solution of acetate of sodium.

222. FLUECKIGER (gurjun balsam in copaiva).—Dissolve 15 drops of balsam in 20 times as much bisulphide of carbon, and add 1 drop of a cooled mixture of equal volumes of sulphuric and nitric acids. Violet color.

223. FLUECKIGER (essential oils).—When using the sulphuric-acid test, the reaction will be less violent and last longer by first thinning the oils with about 6 to 10 volumes of bisulphide of carbon.

224. FLUECKIGER (oil of peppermint).—I. With fused salicylic acid a bluish-green color is developed; addition of alcohol gives a solution which is blue by transmitted and red by reflected light.

II. Mix 50 drops of oil with 1 drop nitric acid (1:20). After several hours this will exhibit fluorescence (greenish-blue and copper color).

III. With chloral hydrate a reddish to cherry-red color, intensified by addition of sulphuric acid, and varied to dark violet by chloroform.

225. FLUECKIGER (oil of valerian).—Dissolve 1 drop oil in 15 drops bisulphide of carbon, add 1 drop sulphuric acid, and afterwards 1 drop nitric acid (1:20). Blue color.

226. FLUECKIGER (quinia).—I. Thalleioquin reaction, only substituting bromine water for chlorine water (1: 20,000).

II. Chlorine water, (red) ferricyanide of potassium, and ammonia. Red color.

III. A ray of light passing through an acid solution of quinia has a bluish color (1:40,000).

227. FORDOS (lead in tin).—Apply a drop of nitric acid, heat, after cooling apply a drop of a 5-per-cent solution of iodide of potassium. Yellow stain.

Forney—see *McClellan Forney*.

228. FOURCROY (phosphoric acid).—Add chloride of ammonium and ammonia, and then a solution of sulphate of magnesium. White crystalline precipitate.

229. FRANQUI AND VAN DE VYVERE (glucose).—Heat the urine with a solution of hydrated bismuth in potassa. Reduction.

230. FRAUDE (alkaloids).—Boil for several minutes a small quantity with several ccm. perchloric acid (1,13-1,14). Color reactions. See "Proceedings Am. Pharm. Association," xxviii, (1880) p. 322.

231. FRAUDE (aspidospermine).—Boil with perchloric acid (1,14). Intense red color.

232. FRÉBAULT (alkalimetry).—Picramate (dinitramido-phenate) of potassium or sodium. The bright-red color is turned greenish yellow with acids.

233. FREDERKING (alcohol in ether).—Shake with equal volume of glycerine. Alcohol will increase the volume of glycerine.

234. FRESENIUS (carbolic acid).—Separation of metallic mercury and evolution of odor of salicylic aldehyde on boiling with an acid solution of mercurous nitrate.

235. FRESENIUS (nitrous acid).—Acidify with a little acetic acid, distil, and pass the vapor into iodide of potassium-starch paste, acidified with diluted sulphuric acid. Blue color.

236. FRESENIUS AND BABO (arsenic).—Reduction of sulphide of arsenic by heating with cyanide of potassium and carbonate of sodium in a current of carbonic acid gas. Mirror of metallic arsenic.

237. FRISCH (creasote; carbolic acid).—An alcoholic solution of carbolic acid is colored blue by an alcoholic solution of ferric chloride. Creasote is colored emerald-green.

238. FROEHDE (hydrocyanic acid).—Blood-red coloration on dipping a blowpipe-bead of hyposulphite of sodium with a cyanide into a diluted solution of ferric chloride.

239. FROEHDE (alkaloids).—A solution of 0.01 molybdate of sodium in 10 ccm. sulphuric acid. Must always be freshly pre-

pared. Color reactions. See Hager, Pharm. Praxis, I, p. 207-210.

240. FROMMHERZ (glucose).—Similar to *Fehling*.

241. FUERBRINGER (mercury in urine).—“Brass-wool” is immersed into the acidified urine, and rinsed with water, absolute alcohol, and ether. Heat to redness in a combustion-tube containing in one end a little iodine. Mercury evaporates and, passing over iodine, deposits red biniodide.

242. GALIFE (albumen).—Add the urine drop by drop to a solution of picric acid. White cloudiness.

243. GANSWINDT (purity of oil of rose).—Dissolve 1 drop in $1\frac{1}{2}$ fl. ozs. water, and atomize in a moderately warm room. Adulteration recognized by the odor.

244. GATEHOUSE (arsenic). Heat the liquid in a test-tube with caustic soda and a strip of aluminium, and cover the tube with nitrate of silver paper. Black stain.

245. GAWALOVSKI (alcohol in balsam Peru).—Add to a solution of bichromate of potassium in sulphuric acid. Odor of aldehyde.

246. GAWALOVSKI (alkalimetry).—A mixture of alcoholic solutions of phenolphthalein and methyl-orange. Turns deep red with alkalies; rose-red with acids; lemon-yellow when neutral.

247. GAYARD [Guyard?] (tannin; gallic acid).—Add a concentrated solution of acetate of lead. The tannate is insoluble, the gallate soluble (?).

248. GEISSLER (fuchsine in wine).—I. Add ammonia in excess, and shake with fusel-oil, which only takes up the fuchsine.

II. Heat 100 ccm. claret to 60° C., pour into it 4 to 5 grams fused stearine, shake briskly, and let cool slowly. Stearine will be found colored red.

248 bis. GEISSLER (albumen).—Iodide of potassium, 3.32 grams; corrosive sublimate, 1.35; acetic acid, 20 ccm.; water, 40 ccm. White precipitate.

249. GEITH (stearine in wax).—Lime-water, on boiling with wax containing stearine, loses its alkalinity.

250. GERBER (fixed oils in copaiba).—Shake with ammonia. Pure balsam remains clear; cloudiness indicates presence of fixed oils.

251. GERHARDT (brucia).—Dissolve in nitric acid, and heat till the solution acquires a yellow color, then add water and a solution of stannous chloride. Violet color.

252. GERHARDT (biliary matter).—I. Extract the urine with

chloroform, decant, and mix with ozonized oil of turpentine and a little dilute solution of potassa. Green color.

II. Add to the chloroform extract iodine and sufficient dilute solution of potassa. Yellow to brownish-yellow color, with green fluorescence.

253. GERRARD (atropia).—Add a 5-per-cent solution of corrosive sublimate in 50-per-cent alcohol, warming gently. Brick-red precipitate.

254. GILBERT (phosphoric acid).—“Magnesia mixture.” (10.15 grams crystallized chloride of magnesium, 20 chloride of ammonium, 40 15-per-cent ammonia, water up to 100 ccm. Indicates 3.55 grams phosphoric acid.)

255. GIRARDIN (sulphurous acid in muriatic acid).—Add to 16 muriatic acid, 10 crystallized stannous chloride and 2 to 3 volumes water. Yellowish-brown precipitate.

256. GLAESSNER (fixed oils).—Potassa, acids, litharge, alcohol, etc. Scheme, see Fresenius, *Zeits. Analyt. Chem.* (1872), p. 846-7.

257. GLÉNARD (alkaloid quinia).—Add a drop of a solution of sulphate, phosphate, or oxalate of ammonium, and observe under the microscope. Quinia appears in needle-shaped crystals. Cinchonia is amorphous.

258. GMELIN (biliary matter).—In a conical glass vessel put 6 to 8 volumes urine, and pour cautiously down the sides of the vessel 2 volumes of (1 25-per-cent nitric acid and 1 red fuming nitric acid), so that it collects at the bottom. Green to blue, violet, and yellow color.

259. GOBEL (purity of olive-oil).—Elaiometer (spec. grav.).

260. GODEFFROY (alkaloids).—I. Silico-tungstic acid. Precipitates.

II. A solution of ferric chloride in muriatic acid.

III. A solution of terchloride of antimony in muriatic acid.

IV. A solution of stannous chloride in muriatic acid. See “Proceedings Am. Pharm. Association,” xxv, (1877) p. 262; xxvi, (1878) p. 559.

261. GODEFFROY (cinchona alkaloids).—Microsulphocyanide test. See Proceedings, xxvi, (1878) p. 569-572.

262. GOLDING - BIRD (aldehyde in spir. æth. nitr.).—Add a dilute solution of potassa. Yellow color.

263. GORUP-BESANEZ (creasote).—Add an alcoholic solution of

ferric chloride. Emerald green. (A blue color indicates carbolic acid.)

264. GORUP-BESANEZ (peptone).—"Biuret" reaction. Add a little of a solution of potassa or soda and a few drops of a very much diluted solution (almost colorless) of sulphate of copper. Pale rose-red color. (Albumen is indicated by blue; albuminates by violet.)

265. GRAHAM (alkaloids).—Isolation by dialysis.

266. GRAHAM AND HOFFMANN (alkaloids).—Take up with animal charcoal, and deprive this of the alkaloids by more effective solvents.

267. GRAHE (cinchona barks).—Heat the powdered bark in a test-tube. Crimson-red vapors. (Brown vapors indicate barks not of true cinchonas.)

268. GRANDEAU (alkaloids).—I. Color reactions on dissolving in sulphuric acid and adding bromine water.

II. Isolated by dialysis. See *Am. Jour. Pharm.*, xxxvi, (1864) p. 414-416.

269. GRANDEAU (digitalin).—Sulphuric acid dissolves it with a green color, which is turned into currant-red by bromine vapors; addition of water turns the red color into green.

270. GRANGÉ (iodine).—Hyponitrous acid and chloroform (or starch paste). Violet (or blue) color.

271. GRÉHAULT (Gréhant?) (fixed oils of Cruciferæ).—Boil with an aqueous solution of potassa, and add a solution of nitrate of silver. Black color.

272. GRIESS (nitrous acid).—I. Acidify with sulphuric acid, add aniline-sulphuric acid, and ten minutes afterwards a few drops of a solution of naphthylamin sulphate (previously decolorized with animal charcoal). Deep red color.

II. Phenylendiamin (= meta-diamidobenzol). Yellow to brown color.

III. A solution of diamidobenzoic acid in sulphuric acid. Yellow to brown color.

273. GRIESSMAYER (free alkalies).—To 1 drop of a solution of tannin add 1 ccm. 1-100-normal solution of iodine. The colorless mixture acquires a brilliant red color on addition of a faintly alkaline solution.

274. GRIESSMAYER (tannin).—I. Use the above reaction inversely. Red color.

II. Color a small quantity of starch solution bluish by a drop of a very dilute solution of iodine (1:100,000). Addition of liquids containing tannin discharge the color, which is restored on adding a crystal of nitrite of potassium.

275. GRIGG (albumen).—Precipitated by metaphosphoric acid.

276. GRODZKI (acetal). To a dilute solution add a few drops of muriatic acid, then a solution of soda and iodine. Formation of iodoform.

277. GROVE (morphia).—Add 6 drops sulphuric acid to the substance, heat moderately, and add a trace of perchlorate of potassium (entirely free from chlorate). Dark-brown color.

278. GUARESCHI (carbolic acid).—Evaporate a solution to dryness with potassa, and mix residue, while still warm, with chloroform. Purplish-red color.

279. GUILBOURT (purity of oil of rose).—I. Expose under a bell-jar with iodine. Adulterated oil is browned.

II. Vapors of nitrous acid. Apple-green color indicates oil of rose-geranium.

III. Sulphuric acid. The odor of the pure oil is not destroyed.

280. GUY (alkaloids).—I. Microsublimation. See *Am. Jour. Pharm.*, xxxix, (1867) p. 432, 538; xl, (1868) p. 241.

II. Sulphuric acid (cold, warm, hot).

III. Sulphuric acid and permanganate of potassium. See *Am. Jour. Pharm.*, xxxiii, (1861) p. 517.

281. GUYARD [Gayard?] (manganese in presence of zinc).—Treat with diluted sulphuric acid and electrolyze the clear solution (the negative electrode being copper or brass, the positive platinum). Violet color around the platinum.

282. GUYOT (ammonia). Add to an acid solution of nitrate of mercury sufficient solution of bromide of potassium till the first precipitate is dissolved again, then solution of potassa till an orange-yellow precipitate begins to appear; filter. White precipitate.

283. GUYOT (iodoform).—Heat in a flask, and pass the vapor through a heated tube over starch. Blue color.

284. HAFFSTEDT (bitter substances).—Subacetate of lead; tannin; water; ether; alcohol. See "Proceedings Am. Pharm. Association," xxii, (1874) p. 226.

285. HAGEN (strychnia).—Sulphuric acid and peroxide of lead. Bluish-violet color.

286. HAGER (glucose).—To 30 red oxide of mercury and 30 acetate of sodium add 25 glacial acetic acid, 50 chloride of sodium, and 400 water; after solution dilute up to 1 litre. Add of this test an excess to the liquid to be tested. Separation of mercurous chloride.

287. HAGER (free mineral acids in vinegar).—To 20 ccm. vinegar add 5 to 6 ccm. ammonia, and evaporate at above 70° C. Crystalline residue.

288. HAGER (alcohol in essential oils).—I. Shake with an equal volume of water containing about two thirds glycerine (or better, with a solution of 1 nitrate of sodium in 3 water); let stand. The volume of the oil will be diminished in proportion to the amount of alcohol.

II. Add to 5 drops of oil a fragment of tannin, agitate, and leave for several hours at ordinary temperature. In absence of alcohol the tannin remains solid, porous, and floats; in presence of alcohol it gets pasty, adheres to the glass, and sinks.

289. HAGER (chloroform in essential oils).—To 15 drops oil add 50 to 60 drops alcohol and 30 drops diluted sulphuric acid, shake well, and heat with a few pieces of zinc. After twenty minutes (or when all evolution of hydrogen has ceased) add an equal volume of cold water, shake, and run through a wet filter. Acidify strongly with nitric acid, and add a solution of nitrate of silver. Precipitate of chloride of silver.

290. HAGER (alkaloids).—I. Yellow precipitates with a solution of picric acid (1:100). See Hager, *Praxis*, i, p. 202.

II. Isolation. See Hager, *Praxis*, iii, p. 60-63.

291. HAGER (ammonia).—Solution of mercurous nitrate. Black precipitate, or only a brown coloration.

292. HAGER (analysis).—"Drop" method. See *Pharm. Record*, 1884, p. 337, or *Am. Jour. Pharm.*, 1884, p. 416.

293. HAGER (arsenic).—I. Heat liquid with solution of potassa in excess, zinc, and a small magnesium ribbon. Evolution of arseniuretted hydrogen. Test in any convenient way.

II. Acidify strongly with muriatic acid, and place a drop on a piece of thick tinfoil, heating to not above 90° C. Steel-colored to brown stain.

III. Boil the substance or liquid with chloride of sodium,

ferrous chloride, and dilute sulphuric acid. Pass the formed chloride of arsenic and muriatic acid gas into water. Test in any convenient way.

IV. "Kramato" method. Let one drop of a strongly acidified (muriatic acid) solution fall upon a strip of bright brass, and heat moderately. Bluish to black stain, or only a violet ring.

V. Put into a test-tube diluted sulphuric acid, a small piece of zinc, and the substance or liquid. Close the tube with a cork having two slits. Insert into one a strip of acetate of lead paper, into the other a strip of nitrate of silver paper. Lead paper will indicate sulphuric acid; silver paper, arsenic. Test the stain on the latter paper with a 10-per-cent solution of cyanide of potassium. Arsenic stains do not dissolve.

294. HAGER (brucia).—Dilute sulphuric acid and peroxide of manganese are added to a solution of brucia, and filtered. Yellowish to blood-red color. Heating the filtrate with nitric acid in presence of stannous chloride changes the color to violet.

295. HAGER (citric and tartaric acids).—A solution of potassa in 2 water and 1 alcohol is poured upon a glass plate, and crystals of the acids placed at intervals of 1 to 2 inches. After 1 to 2 hours citric acid is nearly dissolved without losing its transparency. Tartaric acid soon becomes opaque white.

296. HAGER (oil of turpentine in copaiva).—I. Make a thin paste by mixing 1 drachm of balsam with 5 to 6 drops of water and sufficient litharge. Odor of turpentine becomes very apparent.

II. Pure balsam mixes clear with $1\frac{1}{2}$ volumes 90-percent alcohol, and gets turbid with $1\frac{1}{2}$ volumes more. Other behavior indicates adulteration.

297. HAGER (dextrine).—Boil liquid with molybdate of ammonium and a little citric acid. Blue color.

298. HAGER (fusel oil).—Dip a roll of filtering-paper into the alcohol (mixed with 10 p. c. glycerine), and let dry at a temperature not above 25° C. Odor of fusel-oil prominent.

299. HAGER (iodic acid in nitric acid). To 3 ccm. acid add 3 drops of solution of sulphite of sodium; after one minute add 5 ccm. ammonia and 1 drop solution of nitrate of silver. A cloudiness or precipitate, which does not disappear on the addition of several cubic centimetres of ammonia.

300. HAGER (nitrobenzol in oil of bitter almonds).—Dissolve 10 drops of oil by gentle agitation in 10 ccm. 45-per-cent alcohol. Pure oil dissolves clear, adulterated cloudy.

301. HAGER (nitrous acid).—Carbolic acid. Red, then brown and green coloration.

302. HAGER (nitric acid).—Molybdic acid and sugar. Blue color.

303. HAGER (essential oils).—I. Solubility in alcohol (= opalescence). See "Proceedings Am. Pharm. Association," xxx, (1882) p. 318-320.

II. Shake 5 to 6 drops oil with 25 to 30 drops sulphuric acid; note heat and turbidity. Then, after cooling, add 8 to 10 ccm. 90-per-cent alcohol, shake briskly; note color and turbidity. See Prescott, Organ. Analysis (1874), p. 111-114.

304. HAGER (fixed oils).—"Elaidin" test. Shake the oil with an equal volume of 25-per-cent nitric acid, add a strip of copper turnings, and set aside at ordinary temperature. Examine each fifteen minutes. See Prescott, Organ. Analysis (1874), p. 76-77.

305. HAGER (phosphorus).—Take up with ether or benzine, and heat to 30-40° C., exposing a strip of nitrate of silver paper to the vapors. Black stain.

306. HAGER (purity of quinia).—Shake well 2 grams of the sulphate with 20 ccm. cold water, and filter. Dilute the filtrate with an equal bulk of water, add 10 to 12 drops solution of salicylate of sodium (1:5), and shake. Clear solution. Cloudiness indicates presence of the other cinchona alkaloids.

307. HAGER (salicylic acid).—Substances interfering with the iron reaction. See *Am. Jour. Pharm.*, 1880, p. 264, or "Proceedings Am. Pharm. Association," xxviii, (1880) p. 311.

308. HAGER (salts of sodium; also those of lithium and ammonium). Add a mixture of 5 crystallized stannous chloride, 10 water, and sufficient solution of potassa. White cloudiness.

309. HAGER (strychnia in santonin).—Shake well 2 grams santonin with 6 ccm. water, and filter. Add 1 to 2 ccm. saturated solution of picric acid. If cloudiness or precipitate occurs, the santonin is to be suspected and must be examined further.

310. HAGER (sugar in glycerine).—Boil 5 drops glycerine with 100 drops water, 3 to 4 centigrams molybdate of ammonium, and 1 drop 25-per-cent nitric acid. Blue color.

310 bis. HAHNEMANN (lead and copper in wine).—Dissolve 1

tartaric acid in 64 water, and shake it briskly with 1 sulphuret of calcium for some time. Let stand, and decant the clear liquid. Black or brown precipitate.

311. HAINES (glucose; reduction).—3 sulphate of copper, 9 caustic potassa, 100 glycerine, 600 water.

312. HAMLIN, Jr. (alkaloids).—Sulphuric acid with bichromate of potassium, and afterwards with chlorinated lime. Color reactions. See *Am. Jour. Pharm.*, 1881, p. 288-5, or "Proceedings Am. Pharm. Association," xxix, (1881) p. 324.

313. HAMMARSTEN (indican).—Mix 10 ccm. of the urine well with 3 to 5 ccm. chloroform, 10 ccm. fuming muriatic acid, and add then 1 drop of a saturated solution of chlorinated lime. Agitate very gently by turning the test-tube slowly up and down. Blue color of the chloroform. (Too much or too strong solution of chlorinated lime changes the color to green.)

314. HAMMARSTEN AND ROBBERT (thymol).—Mix with half the volume of glacial acetic acid, add an equal volume of sulphuric acid, and heat. Reddish-violet color.

315. HARDY (alcohol).—Guaiac, hydrocyanic acid, and sulphate of copper. Blue color.

316. HARDY (alcohol in chloroform).—Sodium. Evolution of hydrogen.

317. HARNACK (iodine in urine).—Shake with starch paste and bisulphide of carbon.

318. HASLAM (albumen).—Mix the urine with a few drops of solution of chloride of sodium, and pour solution of ferric chloride cautiously on top. Whitish zone.

319. HASSALT (aconitum).—Dissolved in syrupy phosphoric acid, and cautiously evaporated. Violet color.

320. HAUGK (hyposulphites).—Solution of permanganate of potassium. Color changed to bluish green.

321. HEHN (essential oils; color reactions). Metachloral. Saturate alcohol with chlorine, distil off part of the muriatic acid, mix with sulphuric acid, and distil.

322. HEIDENREICH (fixed oils).—Mix 10 to 15 drops of oil with 2 drops sulphuric acid (1,825-1,830). Color reactions.

323. VAN HELMINGEN (quinia).—Crystalline precipitate on adding a solution of oxalate of ammonium. See *Am. Jour. Pharm.*, xxx, (1858) p. 242-4.

324. HEINRICH (glucose).—Dissolve 18 red iodide of mercury

and 25 iodide of potassium in water, add 10 potassa, and water up to 1 litre. Heat, and add the liquid to be examined. Reduction. (40 ccm. = 0.1342 glucose.) See "Proceedings Am. Pharm. Association," xxvii (1879), p. 447.

325. HEINSRUS (albumen).—Mix 5 to 10 ccm. of the clear liquid with 1 or 2 drops diluted acetic acid, and boil up once. Add sufficient solution of chloride of sodium to make the whole liquid contain at least 4 per cent of the salt. Precipitate.

326. HELLER (glucose).—Brown coloration on heating with caustic potassa.

327. HELWIG (alkaloids).—Microsublimation. See *Am. Jour. Pharm.*, xxxvii (1865), p. 29, or Fresenius, *Zeits. Analyt. Chem.*, (1864) p. 43.

328. HELWIG (solania).—A mixture of equal volumes sulphuric acid and alcohol. Cherry-red color.

329. HEMPEL (iodides).—Add to the liquid a little solution of ferric chloride and sulphuric acid, then starch paste. Rose-red color.

330. HENNINGER (nitrobenzol in oil of bitter almonds).—Add solution of potassa. Green color.

331. HENRY (iodine).—Liberate by solution of permanganate of potassium.

332. HENRY AND HUMBERT (iodine and bromine in water).—Precipitate the water with an acid solution of nitrate of silver, mix the precipitate with cyanide of silver, and pass a current of dry chlorine over it. Formation of iodide (or bromide) of cyanogen.

333. DE HENRY (alkalimetry).—Litmus is best used by monochromatic light (sodium flame). The red color appears colorless, and the blue color black. The transition is thus made very sharp.

334. HEPPE [Hoppe?] (essential oils).—Drop 25 drops of the oil on to a fragment as large as a pea of nitroprusside of copper, heat to boiling, and set aside. Color reactions. See *Am. Jour. Pharm.*, xxix (1857), p. 325, or Prescott, *Organ. Analysis* (1874) p. 115.

335. HEPPE (chlorates).—Solution of sulphate of aniline (containing toluidin) mixed with 2 volumes sulphuric acid. Intensely blue color.

336. HEPPE (coumarin).—Add to an alcoholic solution a few

drops of tincture of iodine, and let evaporate spontaneously. Greenish-golden color.

337. HERBST (aconitine).—Violet coloration on cautiously evaporating the solution with phosphoric acid.

338. HERBST (atropia).—Sulphuric acid and bichromate of potassium (or molybdate of ammonium) and a little water. Odor of oil of bitter almonds.

339. HESSE (purity of quinia).—Add ammonia and ether to an aqueous solution in Hesse's "quininometer." If the ethereal solution is devoid of crystals, the sulphate of quinia is sufficiently pure for practical purposes. See "Proceedings Am. Pharm. Association," xxvii (1879), p. 500; xxviii, p. 326.

340. HESSE (codeia).—Dissolve in sulphuric acid, and add solution of ferric chloride. Blue color.

341. HESSE (morphia in quinia).—Mix the suspected sulphate of quinia with diluted (1:4) nitric acid. Pure sulphate has a scarcely perceptible tint; morphia gives the solution a yellowish to orange-red color.

342. HESSE (purity of quinidina).—Shake well 0.5 gram with a solution of 0.5 iodide of potassium in 10 ccm. hot water, filter after one hour, and add 1 drop of ammonia. No cloudiness must appear.

343. HEUSCHEN (amygdalin).—Reduce the part of the plant (or the substance) to a fine powder, add a little chalk, a little coarse rye flour, and water; let ferment. Test the hydrocyanic acid gas with a strip of cuprous guaiac paper. Blue color.

344. HILGER (arsenic).—Acidify strongly with muriatic acid, and add an aqueous solution of iodine in excess. Introduce a piece of pure zinc, and expose nitrate of silver paper to the gas. Black stain.

345. HILGER (albumen).—Acidify with acetic acid, and add solution of ferrocyanide of potassium. Precipitate.

346. HILGER (iodic acid in nitric acid).—Dilute with water, and shake with 25 per cent bisulphide of carbon in presence of a few pieces of rasped tin. Violet color of the bisulphide.

347. HIMLY (oiled wheat).—Shake the grain with bronze powder, and rub with filtering-paper. Only the oiled grains will appear bronzed.

348. HIMLY (mineral substances in flour).—Shake the flour with chloroform, let deposit, and examine sediment.

349. HIMMELMANN (arsenic).—*Marsh's* method, substituting

for the acid and zinc an ammoniacal solution of chloride of ammonium which has been heated gently with a mixture of equal parts of granulated zinc and powdered iron. Add the neutral or alkaline liquid to be examined. Evolution of arseniuretted hydrogen.

350. HINDELÄNG (albumen).—Dissolve a small piece of metaphosphoric acid in cold water, and add to the clear (or filtered) urine. Opalescent cloudiness or precipitate.

351. HINTERBERGER (atropia).—A current of cyanogen passed into an alcoholic solution. Blood-red color.

352. HIRSCH (carbolic acid).—Add tincture of chloride of iron to an aqueous solution. Purple color.

353. HIRSCHSOHN (resins; balsams).—Scheme for separation, see *Am. Jour. Pharm.* 1878, p. 180; *Pharm. Record*, 1884, p. 112, or "Proceedings Am. Pharm. Association," xxvi (1878), p. 449-466.

354. HIRSCHSOHN (wax).—Scheme for separation of the different varieties. See *Am. Jour. Pharm.* 1880, p. 303; *Pharm. Record*, 1885, p. 127, or "Proceedings Am. Pharm. Association," xxviii (1880), p. 291-2.

355. HISTED (nataloin; barbaloin).—Add a few grains to several drops of sulphuric acid, and pass a glass rod, moistened with nitric acid, gently over the surface. Nataloin turns blue; barbaloin, red.

356. HLASIWETZ (hydrocyanic acid).—Blood-red coloration on heating an alkaline-cyanide solution with picric acid.

357. HOFFMANN (benzol).—Heat with fuming nitric acid. Subject the nitrobenzol formed to the action of alcohol, muriatic acid, and granulated zinc. Test the aniline produced with chlorinated lime.

358. HOFFMANN (chloroform).—Add aniline, alcohol, and soda. Formation of isonitril (characteristic odor).

359. HOFFMANN (carbolic acid).—On top of 2 ccm. sulphuric acid pour cautiously 2 ccm. of the liquid, and drop into it a few crystals of nitrate of potassium. Violet color or streaks (0.001 gram).

360. HOFFMANN (aniline).—Fuming nitric acid. Deep-blue color; turns yellow on slightly heating it, and finally red.

361. HOFFMANN (nitric acid).—Chrysaniline (phosphin).

362. HOFFMANN (alkalimetry).—Eupittonic acid. Its orange color is turned by alkalies into blue (1:60,000).

363. HOFFMANN (bisulphide of carbon).—Triethyl-phosphin. Rose-red color.

Hoppe—see *Hoppe*.

364. HORSFORD (glycocol).—Boil with a solution of potassa. Bright-red color.

365. HORSLEY (alkaloids).—Nitroprusside of sodium. Crystal-line precipitates.

366. HORSLEY (glucose).—I. Sulphate of copper 30, water 1440; add tartaric acid 30; let cool; add potassa 90 and carbonate of potassium 90. Reduction.

II. Green color on boiling with a solution of (yellow) chromate of potassium containing free alkali.

367. HORSLEY (morphia).—I. A solution of (red) ferricyanide of potassium. After several hours a red color.

II. Add a few drops of solution of nitrate of silver. Reduction of the silver; add nitric acid to the filtrate. Blood-red color.

368. HORSLEY (strychnia).—Add a solution of bichromate of potassium to a solution of a strychnia salt—separation of crystals; add a drop sulphuric acid. Purple-violet to red color.

369. HOW (alkaloids).—Sulphuric acid and chloride of iron. Color reactions. See "Proceedings Am. Pharm. Association," xxvi (1878), p. 560.

370. HOWIE (turmeric in rhubarb).—Put 6 grains powdered rhubarb in a little heap on filtering-paper, and pour on it 50 drops chloroform. After drying, put a piece of borax on the stain, and then a drop of muriatic acid. Red color, which changes to greenish black (or black) with potassa.

371. HUBER (free mineral acids).—A mixture of solutions of molybdate of ammonium and ferrocyanide of potassium. Red cloudiness, which disappears on adding the smallest excess of alkali.

372. HUENEFIELD (blood).—French oil of turpentine, mixed with an equal bulk of alcohol and chloroform; add glacial acetic acid (one tenth of the bulk of turpentine), and drop to it water as long as the mixture remains clear. Use with an equal bulk of tincture of guaiac (1:10). Dark-blue precipitate.

373. HUME (free mineral acids in vinegar).—Evaporate a neutral solution of molybdate of ammonium on a platinum foil to dryness, add a couple of drops of the vinegar, and heat till barely moist; let cool. Color reactions.

874. HUME (arsenic).—Pass arseniuretted hydrogen into an ammoniacal solution of nitrate of silver. Black color.

875. HUSEMANN (morphia).—Heat for half an hour with sulphuric acid, and after cooling add 1 drop nitric acid. Blue-violet to red color (one-eighteenth milligram).

876. ILIMOW (albumen).—Acidify the urine, if necessary, with acid phosphate of sodium; let settle, cool, and filter. Add diluted carbolic acid (1:20). Cloudiness and flocculent deposit.

877. JACKSON (titanium).—To a solution in muriatic or sulphuric acid add peroxide of hydrogen. Yellow to orange color (1:50,000 titanium or 1:250,000 peroxide of hydrogen).

878. JACOBSEN (acid in fixed oils).—Fuchsine. Dissolves in the acid, but not in the neutral oil.

879. JACQUEMART (alcohol).—Solution of mercuric nitrate. Reduction, and a black precipitate upon the addition of ammonia.

880. JACQUEMIN (alkalies).—A mixture of a solution of pyrogallic acid and a mere trace of solution of ferric chloride. The reddish-brown color turns blue.

881. JACQUEMIN (alkaloids).—As above. Turns blue also.

882. JACQUEMIN (aniline).—Solution of chlorinated soda and a few drops of a very dilute (1 drop in 80 ccm. water) solution of sulphide of ammonium. Rose-red color (1:250,000).

883. JACQUEMIN (carbolic acid in oil of cloves).—Add a trace of aniline, shake with water, and add a solution of chlorinated soda. Blue color.

884. JACQUEMIN (iodine).—Pyrogallic acid. Brown color.

885. JACQUEMIN (nitrobenzol in oil of bitter almonds).—A solution of stannous chloride in caustic soda. Formation of aniline; blue color on adding carbolic acid and chlorinated soda.

886. JACQUEMIN (textile fibres).—Soak in a warm dilute solution of chromic acid, and wash out. Wool and silk are dyed; cotton is not.

887. JAILLARD (purity of oil of rose-geranium).—Add 6 drops to 5 ccm. 70-per-cent alcohol. Pure oil dissolves completely.

888. JASSOY (morphia in quinia).—Shake with 20 times its weight of cold water, filter, add iodic acid and then chloroform. Rose-red color of chloroform.

889. JEHN (oil of peppermint).—Mix with chloral hydrate. Dark cherry-red color, which on addition of sulphuric acid and chloroform turns violet.

890. JOFFRE (dyes and colors).—Action of nitric acid, muriatic acid, potassa, ammonia, ferric sulphate, stannous chloride. See *Chem. News*, xlvi. (1882) p. 211, 250, 260.

891. JOHNSON (arsenic).—Heat with soda and a strip of aluminium. Evolution of arseniuretted hydrogen. Test with nitrate of silver paper.

892. JONES (chlorides, bromides, iodides in the same mixture).—Place in a large test-tube the substance (or liquid), and add a few pieces of peroxide of manganese with a little water. Add 1 drop dilute (1:10) sulphuric acid. A brown color (iodine). Boil; violet vapors (iodine). Boil till the violet vapors cease, then add 2 ccm. diluted (1:10) sulphuric acid, and boil. Brown vapors (bromine). Boil till the brown vapors cease. Let cool, and add an equal volume sulphuric acid; heat. Green vapors (chlorine).

893. JORISSEN (alkaloids).—Chloride of zinc (= pour muriatic acid upon excess of distilled zinc, filter, evaporate and fuse). 1 gram in 30 ccm. muriatic acid, add 30 ccm. water. Color reactions. See "Proceedings Am. Pharm. Association," xxviii (1880), p. 321; xxix (1881), p. 267.

894. JORISSEN (nitrous acid).—A solution of 1 centigram fuchsin in 100 ccm. glacial acetic acid. Add to 2 ccm. of this solution a trace of an alkaline nitrite. Violet to blue, dark-green, yellowish-green, reddish-yellow color.

895. JORISSEN (fusel-oil).—To 10 ccm. alcohol add 10 drops colorless aniline oil and 2 to 3 drops muriatic acid. Red color. (If present in very small quantity, shake the liquid with ether, which let evaporate; test the residue as above.)

896. JORISSEN (morphia).—Red color, turning violet on heating with sulphuric acid, adding a small crystal of protosulphate of iron, and then pouring cautiously into ammonia. The latter turns blue.

897. JORISSEN (mineral acids in vinegar).—Add the vinegar to a mixture of 1 drop gurjun balsam and 25 drops glacial acetic acid. Purple color.

898. JORISSEN (iodine in bromine).—Mix a few drops with 30 ccm. saturated solution of chlorate of potassium, and boil till colorless. Let cool, add a few drops solution of morphia (1 gram in excess of diluted sulphuric acid, and dilute with water to 100 ccm.) and a little chloroform. Violet color of the latter. For

bromides add 2 to 3 drops of bromine water, and proceed as above.

399. JULIUS (benzidin).—Add solution of bichromate of potassium to an aqueous solution. A voluminous deep-blue precipitate.

400. JUNGMANN (arbutin).—The solution is made alkaline by ammonia and phosphomolybdic acid added to it. Blue color (1: 140,000).

401. ITTNER (hydrocyanic acid).—Formation of Prussian blue in a solution of an alkaline cyanide by a solution of a ferrosoferric salt, acidifying with muriatic acid.

402. KAEMMERER (nitric and nitrous acid in potable water).—Add iodide of potassium-starch paste, and then acetic acid. Blue color indicates nitrous acid. To another portion add sulphuric acid, iodide of potassium-starch paste, and zinc dust. Blue color indicates nitric acid.

403. KALBRUNNER (morphia).—Add 5 to 6 drops of an aqueous solution of chloride of iron (1: 8), then 3 to 4 drops of solution of (red) ferricyanide of potassium (1: 120). Blue color.

404. KERN (gold).—Add 1 drop chloride of gold solution to a large excess of solution of sulphocyanide of potassium. Reddish-orange color and precipitate.

405. KERN (uranium salts).—Solution of ferrocyanide of potassium produces a brown precipitate, which dissolves in muriatic acid; this acid solution, boiled with a few drops nitric acid, turns green.

406. KERNER (purity of quinine).—See Wiegand's edition of Parrish; Dispensatories; or "Proceedings Am. Pharm. Association," xxiv (1876), p. 349; xxix, (1881) p. 329.

407. KERSTEL (tellurium in ore).—Shake the powdered ore with a little water and mercury, and add a little sodium amalgam. Violet color of the water.

408. KERSTING (nitric acid).—Dissolve brucia in sulphuric acid, and add a few drops of it to the liquid. Brilliant red to yellowish green (1: 10,000).

409. KIEFFER (morphia).—Add a solution of (red) ferricyanide of potassium to an alkaline solution of morphia, and then add a solution of ferric chloride. Blue color.

410. KLETZINSKI (quinia).—To a saturated solution of (red) ferricyanide of potassium add five times as much of a saturated

solution of chloride of potassium, then add ammonia to the blackish-green liquid till strongly alkaline. Filter. (It does not keep long.) To the liquid to be examined add an excess of chlorine water, and then the test. Blood-red to violet color.

411. KLUNGE (carbolic acid).—Add a few drops of a solution of oxaniline, then a little ammonia. Blue color.

412. KLUNGE (berberine).—Add chlorine water to an aqueous solution, acidified with muriatic or sulphuric acid. Red color.

413. KNAFF (glucose).—10 grams cyanide of mercury in water, add 100 ccm. solution of caustic soda (1:145), and dilute to 1 litre. Heat to boiling, and add the diluted urine. Reduction, 40 ccm. = 0.1 glucose.

414. KOBELL (bismuth).—Treat on charcoal before the blow-pipe, mixed with an equal part of iodide of potassium and a little sulphur. Scarlet-red color.

415. KOBELL (molybdic acid).—Heat with sulphuric acid, and add alcohol. Blue color.

416. KOEHLER (alkaloids).—Mix the alkaloid with 3 to 5 times as much nitrate of potassium, add 1 to 2 drops sulphuric acid, and a solution of caustic soda. Color reactions.

417. KOETTSTORFER (iodine).—Add bisulphide of carbon, acidify with diluted sulphuric acid, and pass vapors of fuming nitric acid through it. Rose-red to violet color of the bisulphide.

418. KOLTER (hypochloric acid).—Formation of brown oxychloride of mercury on shaking a solution with metallic mercury.

419. KONINCK (potassium salts).—Add a 10-per-cent solution of nitrite of sodium mixed with chloride of cobalt and acetic acid. Yellow precipitate.

420. KOPP (purity of olive-oil).—To 10 volumes oil add 1 nitric acid and a piece of copper wire. “Elaidin” test.

421. KOPP (nitrous acid in sulphuric acid).—Diphenylamin dissolved in sulphuric acid (1:10,000). Blue color.

422. KROUPA (ammonia).—Soak filtering-paper in a yellow solution of fuchsine in acidulated water, and let dry. Exposed to ammoniacal vapors, it changes to a red color.

423. KRUTWIG (silver in lead ore).—Dissolve in nitric acid, and add excess of soda. Gold-colored precipitate. Test further.

424. KUPFERSCHLAEGER (tarry matter in ammonia).—Super-saturate with not too concentrated nitric acid. Brownish-red color

425. LA GRANGE (glucose).—Dissolve 10 grams dry neutral acetate of copper and 400 grams soda in 500 ccm. water. Red precipitate.

426. LAILLIER (purity of olive-oil).—I. Shake 1 volume of (1 chromic acid in 4 water) with 4 oil. Color reactions.

II. Shake 1 volume of (9 chromic acid, 30 water, 80 nitric acid, sp. gr. 1.185) with 4 oil. Color reactions and consistency.

427. LANDAUER (analysis).—Blowpipe reactions. Scheme, see Fresenius, *Zeits. Analys. Chem.*, 1877, p. 385-396.

428. LANDERER (strychnia).—Iodic acid (or an iodate and sulphuric acid), heating gently. Violet color.

429. LANDOLT (carbolic acid).—White or yellowish-white cloudiness or precipitate on adding bromine water in excess (1:40,000).

430. LANDOLT (paraffine in wax).—Sulphuric acid attacks wax at once, but paraffine very slowly.

431. LANGBECK (essential oils).—Solubility of salicylic acid varies according to the oil. See *Pharm. Record*, 1884, p. 446.

432. LANGBECK (alkalimetry).—Nitrophenol. It is colorless in very dilute (1:100,000) acid and neutral solutions. Alkalies turn it yellow.

433. LANGLEY (alkaloids).—Same as *Koehler*.

434. LABONDE (iodine).—Petroleum and nitric acid. Violet color of the petroleum.

435. LASAULX (metallic iron).—Separate from the powdered substance by a magnet, and treat with a solution of tungstic acid. Under the microscope each particle of iron is surrounded by a blue edge. (Organic matter, zinc, and copper must be absent.)

436. LASSAIGNE (hydrocyanic acid).—White cloudiness or precipitate on addition of a solution of sulphate of copper to the slightly alkaline liquid. (In presence of sulphurous acid the reaction is more sensitive.)

437. LASSAIGNE (gum arabic).—A solution of persulphate of iron. A transparent, gelatinous, yellowish precipitate.

438. LASSAIGNE (iodine).—I. Solution of nitrate or chloride of palladium. Brown to blackish color.

II. Chlorine water and starch paper. Violet color.

439. LASSAIGNE (mineral substances in flour).—Shake with chloroform, and examine the sediment.

440. LASSAIGNE (nitrogen).—Heat the substance with double its weight of sodium or potassium to redness, let cool, dissolve in water, and filter. Add a few drops of an old solution of ferrous sulphate and muriatic acid in excess. Blue precipitate.

441. LAUTH (paratoluidin).—To a solution in sulphuric acid add nitric acid. Blue to violet, red, brown color.

Lea, Carey—see *Carey Lea*.

442. LEERS (quinia).—Rub the quinia to a fine powder, shake with ether, then add chlorine water and ammonia. Green color.

443. LEFFMANN (urine in potable water).—Add a solution of nitrate of silver. Brown color.

444. LEFORT (strychnia).—Sulphuric acid and bichromate of potassium. Violet color.

445. LEFORT (morphia).—To the morphia solution add a solution of iodic acid, and then ammonia. Yellow to yellowish-brown color.

446. LEGAL (acetone).—Red color on adding a solution of nitro-prusside of sodium, which turns green on adding potassa.

447. LEHMANN (glucose).—Dissolve in alcohol, add an alcoholic solution of potassa, dissolve the precipitate in water, and add a solution of sulphate of copper. Reduction.

448. LEONHARDI (alcohol in essential oils).—Fuchsine dissolves only in alcohol.

449. LEPAGE (alkaloids).—A solution of 10 iodide of cadmium and 20 iodide of potassium in 60 to 80 water. White or yellowish precipitate.

450. LEPAGE (purity of iodide of potassium).—Dissolve out all iodide of potassium by alcohol of 30 p. c., and examine the residue.

451. LEPEL (magnesium salts).—Solution of alkannin (alkanet red) in a mixture of 2 alcohol and 1 ether, and containing a little carbonate of ammonia. The violet color is changed to blue.

452. LETHEBY (aniline).—I. With sulphuric acid and peroxide of lead (or manganese). Blue to purple.

II. Sulphuric acid and (red) ferricyanide of potassium. Blue to purple.

III. Add diluted sulphuric acid, place a couple of drops on a platinum foil, and expose to the current of a Grove's battery. Bronze-blue to pink color.

453. LETHEBY (arsenic).—Pass the evolved arseniuretted hy-

drogen into a solution of nitrate of silver. Brown to black color.

454. LEUBE (quinia).—Chlorine water, ferrocyanide of potassium and ammonia. Red color.

455. LEUCHS (water in essential oils).—Milkeness on shaking with petroleum benzine.

456. LEX (ammonia).—Add carbolic acid and a few drops of solution of chlorinated lime. Green color.

457. LEX (carbolic acid).—Blue color on adding ammonia and a little chlorinated lime; heat.

458. LIEBEN (alcohol).—Add a crystal of iodine and a few drops of solution of potassa, sufficient to make a clear solution; avoid an excess. Formation of iodoform.

459. LIEBERMANN (sulphurous acid in wine).—By reduction to sulphuretted hydrogen:

I. With sodium amalgam and muriatic acid.

II. Distil and shake with a few drops of a solution of iodic acid and a little chloroform. Violet color of the latter (1: 500,000).

460. LIEBIG (aldehyde).—Added to an ammoniacal solution of nitrate of silver, it reduces the silver to a mirror.

461. LIEBIG (conia).—Pass dry chlorine gas over the conia. Purplish-red, then blue color.

462. LIEBIG (hydrocyanic acid).—Evaporate the liquid with a little sulphhydrate of ammonium in a water-bath, and moisten the residue with 1 drop of solution of ferric chloride. Blood-red color.

463. LIEBIG (purity of quinia). See Wiegand's edition of Parry; Dispensatories; or *Am. Jour. Pharm.*, xxx (1858), p. 241, 245.

464. LIGHTFOOT (tarry matter in acetic acid).—Neutralize with carbonate of sodium or potassium, and add a few drops of a solution of permanganate of potassium. The pink color is discharged in a few minutes.

465. LINDO (alkaloids).—Dissolve in sulphuric acid without heat, add 1 drop of ferric chloride, and heat gently. See "Proceedings Am. Pharm. Association," xxvi (1878), p. 560.

466. LINDO (elaterin).—Add to a few crystals 1 to 2 drops of carbolic acid, then 2 to 3 drops sulphuric acid. Crimson to scarlet color.

467. LINDO (glucose).—A solution in soda or potassa of the

yellow substance obtained by the action of nitric acid on brucia. Yellow, then intensely blue color.

468. LINDO (morphia).—Solution of ammonio-cupric sulphate (= 1 sulphate of copper in 10 water, add sufficient ammonia till clear). Emerald-green color.

469. LINDO (nitric acid).—To 8 or 10 drops carbolic acid add 30 drops of a cooled mixture of 2 volumes sulphuric acid and 1 water. Deep-brown to red color.

470. LINDO (carbolic acid).—Sulphuric acid, water, and a little nitric acid. Deep-brown to red color.

471. LINDO (santonin).—Dissolve in sulphuric acid without heating, and add a very dilute solution of ferric chloride in small successive quantities; agitate. Red to purple, violet color.

472. LIPOWITZ (purity of olive-oil). Rub 8 oil with 1 chlorinated lime. Emulsion, color, etc., according to oil.

473. LIPP (dextrin).—Heat a saturated solution of acetate of lead to 60° C.; add sufficient litharge to harden the mixture; extract with water, and filter. White precipitate.

474. LLOYD (water in spir. æth. nitr.).—Shake with chloroform or castor-oil. Milkiness.

475. LOEW (free oxygen) — Pyrogallo-chinon (= 10 grams pyrogallic acid and 25 phosphate of sodium in 250 ccm. water; oxidize). Blue color in alkaline solution.

476. LOEWE (glucose).—15.305 hydrated oxide of copper (= 40 crystallized sulphate of copper) in 30.0 glycerine, 80 ccm. solution of soda (1,34); heat with 160 ccm. water till dissolved, and dilute up to 1155 ccm. (10 ccm. = 0.05 anhydrous grape sugar). Or to a solution of 16.0 sulphate of copper in 64.0 water add gradually (avoiding heating) 80 ccm. solution of soda (1,34) and 6.0 to 8.0 glycerine; or 6 hydrated oxide of copper (by precipitating a solution of ammonio sulphate with soda, wash precipitate, and dry over sulphuric acid), 6 to 8 glycerine, 50 water, and 56 solution of soda (1,34).

477. LOEWENTHAL (glucose; brown precipitate on boiling).—60 tartaric acid, 240 carbonate of sodium, 5 crystalline ferric chloride, and 500 ccm. hot water.

478. LOEWENTHAL AND LENSSSEN (free muriatic acid in presence of a protochloride).—Peroxide of lead. Evolution of chlorine.

479. LONGI (nitric acid).—Add a few drops of a solution of sulphate of paratoluidin to the liquid, and then add cautiously an

equal bulk of sulphuric acid, so as to form two layers. Red to dark-yellow color. (In presence of chlorates, bromates, iodates, chromates, and permanganates: Blue color.)

480. LUCK (alkalimetry).—Phenolphthalein. Add 1 drop to 100 ccm. of liquid. Acids colorless; alkalies purplish red (1: 100,000).

481. LUCK (bisulphide of carbon in essential oil of mustard-seed).—Distil in water-bath, and add to the distillate an alcoholic solution of potassa, a small excess of acetic acid, and a solution of sulphate of copper. Lemon-yellow precipitate.

482. LUDWIG (mercury in organic substances).—Mix with zinc dust or finely divided copper, and distil off.

483. LUNGE (alkalimetry).—I. Tropæolin (methyl-orange). Mineral acids change the yellow color to crimson. It is indifferent to carbonic acid and to sulphuretted hydrogen.

II. Phenacetolin (= the brown substance obtained by heating for several hours 1 equivalent each of carbolic, sulphuric, and glacial acetic acids). Alkalies turn it red.

484. LUX (alkalimetry).—Flavescin (extracted from half-charred oak-wood). The colorless alcoholic solution is turned yellow by alkalies.

485. MACK (strychnia).—Sulphuric acid and peroxide of manganese. Dark blue, violet, pink, yellow.

486. MAGNIER DE LA SOURCE (uric acid).—Rub the sediment with water, add a few drops of bromine water, and evaporate. Brick-red color, which, on dissolving in potassa, turns blue; in ammonia, purple.

487. MAIER (oil of turpentine in essential oils).—Optical behavior in polarizing apparatus. See *Am. Jour. Pharm.*, xxxvii (1865), p. 338.

488. MAIER (iodine).—Add a very dilute solution of permanganate of potassium to a solution of an iodide containing starch paste and sulphuric acid. Blue color.

489. MAISCH (nitrobenzol in oil of bitter almonds).—I. Shake 2 to 3 ccm. oil with half its weight of fused potassa. Reddish-yellow color, quickly turning green; on adding water a green layer separates, turning red within twenty-four hours.

II. Dissolve 1 oil in 12 alcohol, add 9 potassa, and evaporate to about 14 parts. Pure oil is brownish red, soluble in water, and contains no crystals; nitrobenzol is *crystalline* and insoluble in water.

490. **MAISCH** (croton oil in other oils).—Extract with an alcoholic solution of potassa, add water and muriatic acid, and apply the separated oily layer to the skin. Peculiar eruption.

491. **MAISCH** (essential oils).—I. Upon 5 drops oil in a watch glass let fall 1 drop bromine.

II. To 5 drops oil add 5 drops ethereal solution of bromine (1 volume bromine to 5 ether). Mix slowly just before use. See "Proceedings Am. Pharm. Association," 1859, p. 338; or Prescott Organ. Analysis (1874), p. 109, 110.

492. **MAISCH** (quinia).—To a solution of sulphate of quinia add a concentrated solution of an alkaline acetate. A voluminous, crystalline, jelly-like precipitate.

493. **MAISCH** (turmeric in rhubarb).—Shake the powder for one or two minutes with absolute alcohol, filter, add a concentrated solution of borax, afterwards muriatic acid. The yellow filtrate turns reddish brown with borax, and only a little lighter color with the acid. (Unadulterated rhubarb turns at once light yellow on adding the acid.)

494. **MANGINI** (alkaloids).—Potassio-bismuthic iodide (8 iodide of potassium, 16 iodide of bismuth, 3 muriatic acid) produces no cloudiness with water. Reddish-brown precipitate. See *Am. Jour. Pharm.*, 1882, p. 490, 491, or "Proceedings Am. Pharm. Association," xxxi (1883), p. 266, 267.

495. **MANN** (water in alcohol, air, etc.).—Rub together 1 molybdic acid and 2 citric acid, fuse, and dissolve in water. Strips of filtering-paper are soaked with it, and dried at 100° C. In presence of water this white paper turns blue.

496. **MARCHAND** (iodine).—Dry starch, excess of muriatic acid and bichromate of potassium. Rose to violet color.

497. **MARCHAND** (purity of olive-oil).—Sulphuric acid. Color reactions.

498. **MARCHAND** (cinchona alkaloids).—Nascent oxygen from peroxide of lead and sulphuric acid. See *Am. Jour. Pharm.* xvi (1844), p. 198; xxx (1858), p. 244.

499. **MARCHAND** (strychnia).—Rub with sulphuric acid, containing 1 p. c. nitric acid, and add peroxide of lead. Blue, violet, green, yellow color.

500. **MARCHAND** (organic matter suspended in water).—Place the water in a flask surrounded by black paper in which are cut

two opposite rectangular apertures, and pass a beam of light through the water.

501. MARÉCHAL (biliary matter).—Add to the urine tincture of iodine. Emerald-green color; turns pink and yellow.

502. MARMÉ (alkaloids).—Add 10 iodide of cadmium to a boiling solution of 20 iodide of potassium in 60 to 80 water. (Keeps only when concentrated.) White or yellowish-white precipitate. See *Am. Jour. Pharm.*, xli. (1869) p. 18.

503. MARSH (alkalimetry).—An infusion of the petals of dahlia, to each pint of which is added half a fl. oz. sulphuric acid and 2 grains corrosive sublimate. Neutralize with ammonia. Alkalies turn it green; acids red.

504. MARSH (arsenic).—Evolution of arseniuretted hydrogen. See Wiegand's edition of Parrish, or Dispensatories.

505. MARTIN (nitric acid).—A solution of diphenylamin in sulphuric acid and water. Pour the liquid to be tested to it drop by drop. Blue to almost black color.

506. MASCHKE (alkalimetry).—An alcoholic solution of haematoxylin. Alkalies turn the brownish-yellow color to purplish red.

508. MASCHKE (glucose).—Dissolve 30 crystallized tungstate of sodium in 75 30-per-cent acetic acid and 120 water. Add to the urine one third its volume of the test, filter if necessary, add half the volume concentrated solution of soda and a small fragment of basic nitrate of bismuth; boil. Black deposit.

509. MASCHKE (molybdenum).—Place a couple of drops of sulphuric acid upon a platinum foil, dust upon the acid a little of the powdered substance, heat till vapors begin to escape, let cool, and breathe upon it. Blue color.

510. MASCHKE (nitrous acid in potable water).—Add 6 to 10 drops diluted acetic acid, and then 1 to 2 drops of blue molybdic acid solution. The bluish color disappears within one hour.

511. MASCHKE (alkaloids).—Micro-prismatic analysis. See "Proceedings Am. Pharm. Association," xxx (1882), p. 54, or *Pharm. Journal and Trans.*, 1881 (Dec.), p. 522.

512. MASSET (biliary matter).—Add 2 to 3 drops of sulphuric acid and a crystal of nitrite of potassium to 2 ccm. of the urine. Grass-green color.

513. MASSIE (fixed oils).—To 10 grams oil add 5 nitric acid; stir with a glass rod for a couple of minutes. Note change of

color. Add 1 gram mercury; stir a few times during 3 or 4 minutes. Color reactions.

514. MAUMENÉ (fixed oils).—Mix with sulphuric acid. Note difference of heat produced.

515. MAUMENÉ (glucose).—Soak strips of white woollens in a 38½-per-cent solution of stannous chloride, and dry. If soaked in glucose solution and heated to 130° C., it turns brown to blackish brown.

516. MAYENÇON AND BERGERET (arsenic).—Expose corrosive sublimate paper to the arseniuretted hydrogen, evolved in any convenient way. Lemon-yellow to light-brown color.

517. MAYER (volatile bases).—Comparative reactions of ammonia, trimethylamin, aniline, nicotia, conia. See Prescott, Organ. Analysis (1874), p. 124.

518. MAYER (alkaloids).—13.546 corrosive sublimate and 49.8 iodide of potassium are dissolved in 1 litre water. White precipitate. See *Am. Jour. Pharm.*, xxxv (1863), p. 20; xxxvii (1865), p. 5.

519. MAZZARA (glucose).—Heat liquid with chloride of nickel in presence of a little solution of potassa. Green precipitate.

520. McCLELLAN FORNEY (alcohol and oil of turpentine in essential oils).—Mix 5 drops oil with 1 drop of pentabromide of iodine. See *Am. Jour. Pharm.*, 1882, p. 546, or "Proceedings Am. Pharm. Association," xxxi (1883), p. 219.

521. MÉHU (albumen).—To 10 ccm. of the liquid add 5 drops crude nitric acid, and then 1 ccm. of (1 carbolic acid, 1 acetic acid, 2 alcohol); shake well, and let deposit. If the nitric acid be replaced by 5 ccm. of a saturated solution of sulphate of sodium, the reaction is more sensitive. Flocculent precipitate.

522. MEIN (absinthiin).—Dissolves in sulphuric acid with a brownish color, which soon turns greenish blue, and, on adding water, dark blue.

523. MÈNE (carbolic acid).—Bromine water. Yellowish-white precipitate.

524. MERCK (opium).—Treat with a solution of potassa, and shake with ether. A strip of filtering-paper dipped into the etheral solution, moistened with muriatic acid, and exposed to the vapor of boiling water, turns red.

525. MERGET (mercury).—I. Expose a strip of filtering-paper, moistened with ammoniacal solution of nitrate of silver and dried, to vapors of mercury. Black stain.

II. Dip a copper wire in the liquid to be tested, remove, dry with bibulous paper, wrap up in tissue paper which has been moistened with ammoniacal solution of nitrate of silver. Black stain of the tissue paper.

526. MERMET (sulphocarbonates).—Add an ammoniacal solution of sulphate or chloride of nickel, diluted with water till almost colorless. Currant-red color.

527. MERO (oil of turpentine in essential oils).—Shake with an equal volume of poppy-seed oil. Milky if pure, but clear with oil of turpentine.

528. MERZ (free phosphoric acid).—Apply a drop of the liquid (or the dry substance mixed with sulphuric acid) to the loop of a platinum wire, and hold it close to the lower part of a hydrogen flame. Green color of the flame.

529. MERZ (purity of fixed oils).—Add the suspected oil to an equal volume of oil of undoubted purity, and shake gently. "Streaks" will appear if adulterated.

530. MEYER (purity of codliver-oil).—Shake well 10 volumes oil with 1 of (equal volumes of sulphuric and nitric acids). Bright-red to lemon-yellow color if pure.

531. MIALHE (oil of Cruciferæ).—Saponify with potassa, test filtrate with solution of nitrate of silver. Black color.

532. MILLER (alkalimetry). Tropæolin (methyl-orange). Mineral acids change the yellow color to crimson. It is indifferent to carbonic acid and to sulphuretted hydrogen.

533. MILLON (albumen; urea). Dissolve 1 metallic mercury in 1 nitric acid (1,42). Dilute with twice its bulk of water, and filter after twenty-four hours. Yellow, then red color on heating with the liquid.

534. MODDERMANN (ammonia). A very dilute solution of sulphate of copper. Turbidity.

535. MOHR (free mineral acids).—I. A solution of acetate of iron (free from alkaline acetates) so diluted as to have only a light yellow color. Add to it a few drops of solution of sulphocyanide of potassium. Traces of acids turn it blood red, which color disappears on adding an excess of acetate of sodium.

II. Iodide of potassium-starch paste and a very dilute solution (light yellow) of acetate of iron. Traces of acids turn it red.

III. Add cane-sugar, and evaporate to dryness in a water-bath. Black color (in presence of sulphuric acid).

536. MOHR (analysis).—With test-papers. See "Proceedings Am. Pharm. Association," xxii (1874), p. 50-53.

537. MOHR (potassium salts).—A saturated solution of acid tartrates of potassium and sodium. Neutral solution of potassium salts are converted into acid tartrates, which are precipitated.

538. MOHR (nitroglycerine).—Extract with ether or chloroform, mix with a few drops aniline, evaporate, add a few drops sulphuric acid. Purple to dark-green color.

539. MOORE (glucose).—Turns brown on heating with 3 to 4 p. c. caustic potassa, and evolves an odor of caramel on adding an acid in excess.

540. MORGAN (mercury). Put a couple of drops of the liquid on a bright piece of copper, and add a strong solution of iodide of potassium. Silvery stain.

541. MORRELL (purity of linseed-oil).—Mix 10 parts by weight of oil with 3 crude nitric acid, and let stand. Pure oil, sea-green to greenish yellow; adulterated, light yellow.

542. MORSON (creasote; carbolic acid).—Creasote is insoluble in glycerine; carbolic acid is soluble.

543. MORTON (arsenic).—Apparatus similar to Doeberiner's lamp. The galvanic current decomposing water, replaces the zinc and sulphuric acid.

544. MUELLER (caustic soda in carbonate).—Solution of permanganate of potassium turns green in presence of caustic soda.

545. MUIR (bismuth).—A solution of 1 stannous chloride and 3 tartaric acid in sufficient solution of potassa. Brownish-black precipitate on heating.

546. MULDER (glucose).—Boil with a solution of indigo (= sulphindigote of potassium), adding gradually a solution of carbonate of sodium. The blue color is discharged (turns green and red).

547. MUSCULUS (urea).—Putrescent urine is filtered, the filter washed, stained with turmeric, and dried. This paper turns brown on being dipped into a solution of urea, and let dry.

548. NADLER (morphia).—I. Make the liquid strongly alkaline, and boil with a barely sufficient solution of ammonio-sulphate of copper to color it light blue. Greenish-blue color.

II. Heat with a few drops of (2 volumes sulphuric acid and 1 water), let cool, add ammonia water in excess, let cool, shake with chloroform. Rose-red color.

549. NAPIER (water in ether).—Chloride of cobalt paper. Blue color changes to rose-red.

550. NAYLOR AND BRAITHWAITE (arsenious in presence of arsenic acid).—Mix the following two solutions only when required:

I. 200 grams sulphate copper, 50 ccm. water.

II. 0.50 gram tartrate of sodium, 5 grams soda, 50 ccm. water.

Arsenious acid causes a reduction.

551. NESSLER (free sulphuric acid in vinegar).—Dip a strip of filtering-paper in vinegar containing 2 to 3 p. c. cane-sugar. A brown to black color when dried.

552. NESSLER (free tartaric acid in wine).—Evaporate to syrupy consistency, extract with alcohol, and add a solution of acetate of sodium or potassium. Crystalline precipitate.

553. NESSLER (ammonium salts; yellow or reddish-brown coloration).—Aqueous solution of 1 bichloride of mercury in 6 water mixed with a solution of 2½ iodide of potassium in 6 water, and afterwards with a solution of 6 caustic potassa in 6 water, adding water up to 86 parts.

554. NEUBAUER (carbolic acid).—Add to an aqueous solution ammonia, then solution of chlorinated soda, and heat. Blue color.

555. NEUKOMM (biliary matter).—Extract with alcohol, evaporate to a small bulk, put one drop in a porcelain capsule, add one drop diluted sulphuric acid and a trace of sugar solution; heat gently. Violet color.

556. NICHOLSON (nitric acid).—Evaporate to dryness, moisten with 1 or 2 drops sulphuric acid, and add a mere speck of brucia. Red color.

557. NICKLÉS (fixed oils).—Hydrated lime. Emulsifies or not. See *Am. Jour. Pharm.*, xxxviii (1866), p. 299.

558. NOBEL (terpen).—Red color by muriatic acid. (As test for copaiva and gurjun balsam in urine.)

559. NOËL (biliary matter).—Dip a strip of filtering-paper in the liquid, let dry, and apply a drop of nitric acid. Violet to red and yellow.

560. NOWAK AND KRATSCHMER (alkaloids).—Syrupy phosphoric acid. Color reactions. See *Wiener Akademische Berichte*, 1873, Nos. xxix and xxx.

561. NYLANDER (glucose).—2 grams basic nitrate of bismuth, 4 Rochelle salt in 100 8-per-cent solution of soda; filter. Add 1 volume of this test to 10 liquid. Black precipitate.

562. OBERDOERFFER (alcohol in essential oils).—Expose, together with a watch-glass containing platinum black, under a bell-jar, placing a strip of moistened blue litmus-paper over the platinum black. Reddening from the acetic acid formed.

563. OGSTON (chloral hydrate).—Add yellow ammonium sulphhydrate. Brown color; on heating, a red precipitate.

564. OPWYRDA (turmeric in rhubarb).—Alcoholic solution of boracic acid. Red color, changes to greenish black with potassa.

565. ORLOWSKI (analysis).—Use ammonium thio-sulphate (= hyposulphite) instead of hydrogen sulphide. See *Journal Chem. Soc.*, 1884, p. 368, or Fresenius, *Zeitschrift f. Analyt. Chem.*, 1888, p. 357-366.

566. OSER AND KALMANN (alkalimetry).—Tetrahydroellagic acid (= by action of permanganate of potassium and sulphuric acid upon gallic acid) fused with potassa. Acids turn the red color into yellow.

567. O'SHAUGHNESSY (opium).—Persalts of iron. The red color of meconate of iron is not acted upon by an alkaline solution; sulphocyanide of iron is bleached.

568. OSTER (arsenic in muriatic acid).—Boil the acid with pure tinfoil. Brown stain on the tin.

569. OTTO (morphia).—Formation of Prussian blue by a mixture of muriatic acid, with solutions of ferric chloride and (red) ferricyanide of potassium.

569bis. OTTO (strychnia).—Sulphuric acid and bichromate of potassium. Violet color.

570. OTTO-STAS (alkaloids).—Extract with alcohol containing tartaric or oxalic acid. Then use alcohol and ether. Scheme, see *Am. Jour. Pharm.*, 1874, p. 120, or Fresenius, *Zeitschrift f. Analyt. Chem.*, 1874, p. 72-73.

571. OUDEMANS (quinamina).—Let a drop of the liquid flow on top of sulphuric acid containing a trace of nitric acid. Chestnut-brown to orange-red; on adding water it turns to purple.

572. OVERBECK (iodine).—Pass a current of hyponitrous acid gas into the liquid, previously mixed with starch paste. Blue color.

573. OVERBECK (cotton in woollen).—Soak the fabric in a solu-

tion of 1 alloxanthin in 10 water, wring out and dry. Expose to vapors of ammonia, and rinse in water. Woollen, crimson color; cotton, white.

574. PAGEL (phosphorous in phosphoric acid).—Heat equal volumes of acid and a solution of corrosive sublimate (1:60) to about 176° F. White opalescence or precipitate.

575. PAGENSTECHER (hydrocyanic acid).—Soak filtering-paper in freshly prepared (3 to 4 p. c.) tincture of guaiacum, let dry, and moisten it with a 1-per-cent solution of sulphate of copper. Blue color (1:300,000).

576. PAGLIARI (quinia).—Heat in a spoon over burning charcoal. Color of the fused residue. See *Am. Jour. Pharm.*, xxvi (1854), p. 80.

577. PALM (alkaloids).—I. Sodium sulphantimoniate. Milky to yellow or red-brown precipitates.

II. Chloride of lead, dissolved in a solution of chloride of sodium. Colorless crystalline precipitates. See *Chemical News*, xlvi (1883), p. 65.

578. PALM (nicotia).—Heat gently with a little muriatic acid. Violet color, which on addition of nitric acid turns orange red.

579. PALM (picrotoxine).—Ammoniacal solution of basic acetate of lead. Insoluble salt.

580. PANUM (albumen).—Separation on boiling with a saturated solution of sulphate of sodium.

581. PAPASOGLI (cobalt).—Add a solution of cyanide of potassium till the precipitate redissolves, then add a few drops of yellow ammonium sulphhydrate. Blood-red color.

582. PAPASOGLI (nickel).—Dissolve in a solution of cyanide of potassium, and insert a strip of zinc. The solution turns red, and the zinc gets covered with a black deposit.

583. PAPASOGLI AND POLI (malic acid).—Heat with bichromate of potassium and sulphuric acid. Odor of over-ripe fruit.

584. PAPASOGLI AND POLI (citric, succinic, malic acids).—Precipitate with chloride of calcium, decompose with dilute sulphuric acid, and boil filtrate with bichromate of potassium. Yellow color (succinic acid). Green, without odor (citric acid). Green, with fruity odor (malic acid).

585. PARSONS (analysis).—Proximate, of plants. See *Am. Jour. Pharm.*, 1880, p. 210-219.

586. PASTEUR (cinchona alkaloids).—Distinguished by action

on polarized light. See *Am. Jour. Pharm.*, xxx (1858), p. 241-2.

587. PASTEUR AND WURTZ (fuchsine in wine).—Add to the wine baryta water till faintly alkaline, filter, acidify with acetic acid, and take up fuchsine with fusel-oil.

588. PATROUILlard (arsenic in alkaline salts).—Boil with 4 p. c. oxalic acid, and test the arsenious acid in any convenient way.

589. PAUL (biliary matter).—A solution of methylaniline violet dropped on the urine is turned carmine red.

590. PAVY (albumen).—Pellets of sodic ferrocyanide and citric acid. White cloudiness. See *Am. Jour. Pharm.* (1883), p. 200, or "Proceedings Am. Pharm. Association," xxxi (1883), p. 299.

591. PAVY (glucose).—Cupric test-pellets (alkaline tartrate, sulphate of copper, and potassa or soda).

592. PEGNA (nitrobenzol in oil of bitter almonds).—Mix the oil with alcohol, potassa, and a few drops of a solution of ferric chloride; let stand for a couple of hours, and distil. Pour distillate on potassa, and heat. Dark color; violet on addition of chlorinated lime solution.

593. PELIGOT (glucose).—Solubility of lime. Make two assays of the lime, one with the cold solution, the other with the boiled solution (boiling destroys glucose). The difference between the assays = glucose.

594. PELLAGRI (alkalimetry).—Solution of phyllocyanin with sufficient of any acid to turn it purple. Alkalies turn the color to green and yellow, finally almost black (1:600,000).

595. PELLAGRI (brucia).—Dissolve in muriatic acid, and heat with addition of sulphuric acid. On neutralization with bicarbonate of sodium a blue color is produced.

596. PELLAGRI (morphia).—Evaporate the liquid to dryness, dissolve in muriatic acid, add a few drops of sulphuric acid, evaporate again, add after cooling a little muriatic acid, and neutralize with bicarbonate of sodium. Violet color, which is *not* taken up by ether.

597. PELLET (glucose; reduction). 68.7 sulphate of copper, 200 chloride of sodium, 100 calcined carbonate of sodium, 6.87 chloride of ammonium, dissolved in hot water and diluted to 1 litre. 10 ccm. = 0.05 glucose.

598. PELLETIER (quinia).—Pass chlorine gas into water con-

taining quinia in suspension. Dissolves it with a light red, violet, and finally dark-red color.

599. PELOGGIO (iodine).—Pass a galvanic current through the liquid previously mixed with a little muriatic acid and starch paste. Blue color.

600. PENZOLD AND FISCHER (aldehydes).—Add an alkaline solution of 1 diazobenzene sulphonic acid in 60 water, in presence of sodium amalgam. Red color, turning violet (1: 3000).

601. PERRINS (berberina).—Cautious addition of a dilute solution of iodine in iodide of potassium to an alcoholic solution of berberina. Brilliant green spangles.

602. PERSOZ (textile fibres).—Solution of oxychloride of zinc (10 chloride of zinc, 10 water, and shake several times with 2 oxide of zinc). Dissolves silk.

603. PETTENKOFER (biliary matter).—To a small quantity of the liquid add two thirds its volume of sulphuric acid drop by drop (so as not to heat it above 144° F.), add 2 to 5 drops of solution of cane-sugar (1: 5), and shake. Violet color.

604. PETTENKOFER (sugar).—Add sulphuric acid to an aqueous solution of bile till the precipitate first formed is redissolved; then add the liquid. Violet color.

605. PETTENKOFER (free carbonic acid in water containing bicarbonates).—Dissolve 1 rosolic acid (coralline) in 500 80-percent alcohol, and add baryta water till reddish color. Add 0.5 ccm. of this test to 50 ccm. of the water to be tested. Colorless in presence of free carbonic acid; red color if absent.

606. PETTI (physostigmia).—Saturate it accurately with diluted muriatic acid, add an excess of solution of ammonia, and heat. Pale red, red, yellowish red, green, blue color.

607. PHIPSON (benzoic, hippuric and salicylic acids).—Heat moderately 1 equivalent acid with 3 equivalents glucose and a large excess of sulphuric acid. Brown to finally black color. See "Proceedings Am. Pharm. Association," xxii (1874), p. 251.

608. PHIPSON (frangulin).—Sulphuric acid. Emerald-green, purple, dark red.

609. PICCINI (nitric in presence of nitrous acid).—Add urea to the liquid containing nitrates and nitrites, and add this gradually to another solution of urea in dilute sulphuric acid. As soon as the evolution of nitrogen (from the decomposed nitrites) has

ceased, add iodide of potassium-starch paste and a fragment of zinc. Blue color.

610. PLANTA (alkaloids).—Hydrargyro-iodide of potassium. White precipitates.

611. PLUGGE (nitrous acid).—Heat a mixture of 5 ccm. solution of mercurous nitrate, 5 ccm. solution of carbolic acid (1:100), and 15 ccm. water to boiling, and add 120 to 150 ccm. of the liquid to be examined. Red color (1:500,000).

612. PLUGGE (carbolic acid).—Boil with a solution of mercurous nitrate containing merely a trace of nitrous acid. Red color and reduction, with evolution of odor of salicylous acid (1:60,000).

613. PODWYSSOTSKI (emetia).—Add 1 drop of a freshly prepared saturated solution of phosphomolybdate of sodium in sulphuric acid. Brown color which, on adding 1 drop muriatic acid, is turned blue.

614. POHL (picric acid).—Soak a woollen thread in the liquid, and rinse it in water. Yellow color.

615. POLLACCI (carbolic acid).—I. Pour an aqueous solution on top of sulphuric acid. Red color in line of contact.

II. Add 1 drop of the liquid to sulphuric acid and bichromate of potassium. Brown color.

616. POLLACCI (free sulphuric acid in vinegar).—Strips of filtering-paper are immersed in a beaker containing the vinegar, so that one end touches the bottom and the other projects about 1 centimetre above the top. After 24 to 36 hours a sufficient quantity of the acid will by capillarity have accumulated in the upper end. Cut off and rub with ether, evaporate the ether, take up with water, and examine for sulphuric acid.

617. POLLACCI (glucose).—Shake the liquid with (4 ccm. water, one drop of an aqueous solution of ferric chloride, 6 drops of solution of soda), then boil, and add 2 drops sulphuric acid, let cool, and add a fresh solution of (red) ferricyanide of potassium. Blue color.

618. POLLACCI (iodates in iodides).—Throw into the hot alkaline liquid a piece of phosphorus. It will soon be surrounded by a dark-yellow zone. Amorphous phosphorus reduces promptly iodates to iodides.

619. PORRET (ferric salts).—Solution of sulphocyanide of potassium. Blood-red color (1:1,600,000).

620. POUTET (purity of olive-oil).—Mix the oil with one twelfth of its weight of solution of mercury (6 mercury in 7½ nitric acid, 1:35); shake every ten minutes for two hours, and then put it into a cold cellar. Observe the consistence after twenty-four hours.

621. POWER (elaterin)—Sulphuric acid, a deep-red color; addition of bichromate of potassium, brown to light-green color.

622. POWER (emetia).—Solution of chlorinated lime in presence of 1 drop acetic acid. Bright orange to lemon-yellow color.

623. POWER (glucose).—Heat 1 drop of solution of sulphate of copper (1:14), a slight excess of ammonia, and a little water with the liquid to boiling. Colorless.

624. PRADINES (fuchsin in wine).—Distil off the alcohol, and add to 10 ccm. of the residue 4 ccm. ammonia; shake well with 5 ccm. ether, and let separate. Place a drop of the ethereal layer on a piece of white paper or muslin. Rose-red stain. (Pure wine does not color ether at all.)

625. PRESCOTT (alkaloids).—I. Solubilities. See Prescott, Organ. Analysis (1874), p. 128-9.

II. Successive action of ether, water, chloroform. See Prescott, p. 138.

626. PRESCOTT (carbolic acid).—Add a few drops of nitric acid, then a slight excess of potassa, and dilute with water. Yellow color (1:50,000).

627. PRESCOTT (sulphocarbolates).—Boil the salt in water with nitric acid, and neutralize with potassa. Yellow color.

628. PRICE (iodine).—Mix with starch, add muriatic acid and a solution of nitrite of potassium. Blue color.

629. PROCTER, Jr. (extract of Cannabis indica).—Nitric acid converts it into an orange-red resin.

630. PROCTER, Jr. (mercury).—Put a few drops of the liquid on a bright cent, and put into the drops a large crystal of iodide of potassium so as to touch both the liquid and the copper outside. Silvery stain.

631. PROCTOR (tannin; gallic acid).—Add a faintly alkaline solution of arseniate of sodium or potassium. Green color; on addition of acids, purplish red.

632. PURGOTTI (copper).—Mix with an alkaline chloride, and pour on top of it an alcoholic solution of guaiac. Blue color.

633. PUSCH (tartaric and citric acids).—Heat for one hour in

water-bath 1 gram powdered acid with 10 sulphuric acid. Citric acid has a lemon-yellow color; tartaric acid turns brown or black.

634. PUSCH (benzine; benzol).—Iodine dissolves with a violet color (benzol); or raspberry-red color (benzine).

635. PUSCHER (arsenic in green colors).—Apply ammonia. Blue color. A drop of this ammoniacal solution evaporated leaves a dirty yellowish-green stain. (A pale-blue stain indicates absence of arsenic.)

636. PUSCHER (fuchsine in fruit-juices).—Soak a woollen or silk thread, and rinse in water. Red color of the thread.

637. PUSCHER (alcohol in essential oils).—Dust a little fuchsine on the inside of a test-tube (the upper part), and drop the oil on to the bottom so as not to touch the sides. On heating, alcohol evaporates first and dissolves fuchsine.

638. RAABE (albumen).—Add crystallized trichloracetic acid to the urine. It sinks to the bottom, and is dissolved there. A turbid zone.

639. RABOURDIN (iodine).—Add 2 drops nitric acid, 15 drops sulphuric acid, and a little chloroform. Violet color of the chloroform.

640. READ (carbolic acid; creasote).—Stronger ammonia. Carbolic acid is soluble; creasote insoluble.

641. REALE (free muriatic acid in solution of ferric chloride).—Mix solution of ferric chloride with a little 1-per-cent solution of carbolic acid. If no free acid be present, an amethyst color will appear. Free acid gives a greenish color, and larger quantities prevent coloration.

642. REDWOOD (alcohol in essential oils).—Add nitric acid. Evolution of nitrous acid fumes.

643. REICH (glucose distinguished from cane sugar).—I. Add to a boiling solution of bichromate of potassium. *No* color reaction.

II. Add a solution of potassa, and heat to boiling, then add nitrate of cobalt. *No* violet-blue precipitate is formed.

644. REICHARDT (nitric acid in potable water).—To 1 drop of the water add 3 drops solution of brucia and a few drops sulphuric acid. Red color.

645. REICHE (gum arabic).—Boil with a solution of orcine in muriatic acid. Red to violet color and a blue precipitate, which dissolves in alcohol with a greenish-blue color; addition of

alkalies turns the last color into violet with a greenish fluorescence.

646. REICHL (glycerin).—I. Heat cautiously equal parts glycerine, carbolic acid, and sulphuric acid. A brownish-yellow mass which, on adding water, turns crimson.

II. Boil with a little pyrogallic acid, a few drops sulphuric acid, and dilute with an equal volume of water, then add stannic chloride. Violet-red color.

647. REINSCH (arsenic).—Acidulate solution with muriatic acid and boil, having inserted a strip of bright copper. Bluish spots.

648. REINSCH (sulphurous acid).—A brown to black stain on bright copper in presence of muriatic acid.

649. REYNOSO (iodine).—Mix peroxide of barium with water, starch paste, and muriatic acid. When the evolution of gas commences, add the liquid to be examined. Blue color.

650. RHIEN (fixed oils in essential oils).—Pass steam through the oil till it distils over; shake the residue with ether, which takes up the fatty matter.

651. RICE (carbolic acid).—Put 10 grams chlorate of potassium into a test-tube, add about 1 inch of muriatic acid, and afterwards add 1½ volumes of water. Remove most of the gas by blowing through a glass tube, and pour ammonia cautiously on top, and then a few drops of the suspected liquid. The ammoniacal layer is colored brown to rose-red (1: 1200).

652. RICHMONT (nitric acid).—Red color (afterwards violet and brown) by adding sulphuric acid and afterwards a concentrated solution of ferrous sulphate.

653. RIGHINI (purity of myrrh).—Pure myrrh dissolves in a solution of an equal weight of chloride of ammonium in 15 times as much water.

654. RILEY (chlorine).—Mix 1 bichromate of potassium, 1 of the substance, and 3 sulphuric acid in a beaker-glass, and suspend a small beaker containing ice in the larger one. The evolved chlorochromic acid will condense on the suspended beaker. Add a few drops of ammonia, excess of acetic acid, and a solution of subacetate of lead. Yellow to orange color.

655. RITTHAUSEN (protein).—Dissolve in diluted sulphuric acid, add excess of potassa, and then a few drops of a saturated solution of sulphate of copper. Violet color.

656. ROBIQUET (morphia).—Blue coloration with a persalt of iron.

657. ROBIN (alkaloids).—Mix with twice its weight of sugar, and add 2 drops sulphuric acid; stir with a glass rod. Color reactions. See "Proceedings Am. Pharm. Association," xxix (1881), p. 325, or *Am. Jour. Pharm.*, 1881, p. 285.

658. ROCHELEDER (caffeine).—Heat with muriatic acid and chlorate of potassium (or freshly made chlorine water), and evaporate gently. Yellowish-red color; turns violet on addition of ammonia.

659. RODGERS AND GIRDWOOD (alkaloids).—Extract with chloroform, and carbonize with sulphuric acid. See Prescott, *Organ. Analysis* (1874), p. 132.

660. ROMER (fuchsine in fruit-syrups).—Shake with fusel-oil. Takes up only the fuchsine.

661. ROMER (water in ether).—Well-dried carbolate of potassium is insoluble in pure ether, and hence forms a dense solution in presence of water.

662. ROSENBACH (biliary matter).—Filter the urine, and let a drop of nitric acid run down the side of the filter. Yellow to violet and green. If the filter be dry, moisten it with water, and apply a drop of nitric acid.

663. ROSENSTIEHL (paratoluidin).—To a solution in sulphuric acid add nitric acid. Blue to violet, red, and brown.

664. ROSS (phosphoric acid).—Dissolve the phosphate in a borax bead, and add tungstate of sodium. Blue in reduction flame.

665. ROTH (purity of olive-oil). Sulphuric acid (1,40), saturated with nitrous acid vapors. Color reactions.

666. RUEMPLER (free acids in fixed oils).—Shake with a solution of chemically pure carbonate of sodium (free from caustic soda). An emulsion will be formed.

667. RUMP (purity of quinia).—Ether, ammonia. See Wiegand's edition of Parrish, or Dispensatories.

668. RUNGE (aniline).—I. Purple-violet color (turning rose-red by acids) on adding a solution of chlorinated lime.

II. Even very dilute solutions of muriate of aniline stain pine-wood yellow.

669. RUNGE (carbolic acid).—Blue coloration of a pine shaving, moistened with muriatic acid.

670. RUNGE (cane-sugar).—Blackening on evaporating with diluted sulphuric acid.

671. RUST (creasote; carbolic acid).—Carbolic acid forms a jelly with collodium; creasote not.

672. SABANIN AND LASKOWSKI (citric acid).—Heat with excess of ammonia in a sealed tube at 120° C. for six hours. Yellow color. Pour out, and let stand for several hours. Blue color.

673. SACHSSE (glucose).—Dissolve 18.0 biniodide of mercury and 25.0 iodide of potassium; add 80.0 potassa, and water up to 1 litre. 40 ccm. = 0.1842 glucose. See "Proceedings Am. Pharm. Association," xxv (1877), p. 288; xxvi (1878), p. 527.

674. SALKOWSKI (cholesterin).—Dissolve a few centigrams in 2 ccm. chloroform, and add an equal volume of sulphuric acid. Blood-red color of the chloroform; green fluorescence of the acid. Breathing on the chloroform solution turns the red color to blue, green, and yellow.

675. SALKOWSKI (carbolic acid).—Add one quarter of its volume of ammonia and a few drops of solution of chlorinated lime (1:20); heat gently, but not up to boiling. Blue or greenish color (1:4000).

676. SALZER [Sulzer?] (alcohol in essential oils).—Dust fuchsine on the upper part of the inside of a test-tube, and drop the oil on the bottom so as not to touch the sides of the tube. On heating, alcohol evaporates first, dissolving the fuchsine.

677. SCHAAAL (alkalimetry).—Alizarine. Acids color it yellow; alkalies, rose-red (1:800,000 alkali).

678. SCHACHT (benzoic acid from Siam benzoës).—Decolorizes an alkaline solution of permanganate of potassium. Acids from other source alter the color merely to green.

679. SCHACK (oil of peppermint).—Fused salicylic acid. Blue-green color. Dissolved in alcohol gets blue by transmitted, and red by reflected, light.

680. SCHEIBLER (alkaloïds; precipitate).—Phospho-tungstate of sodium (= 100 tungstate of sodium and 60 to 80 phosphate of sodium dissolved in 500 ccm. water, acidulated with nitric acid).

681. SCHERER (inosit).—An aqueous solution of inosit, evaporated nearly to dryness with nitric acid; to the residue is added ammonia and one drop solution of chloride of calcium: this evaporated turns rose red.

682. SCHERER (phosphorus).—Heat substance to 30-40° C., and

expose a slip of nitrate of silver paper to the vapors. Black stain.

683. SCHERRING (iodates in iodides).—Add to a solution of the salt a crystal of tartaric acid. A yellow zone.

684. SCHERRING (alkaloids).—Phospho-tungstic acid. Precipitates. See "Proceedings Am. Pharm. Association," xxi (1873), p. 369.

685. SCHIFF (cholesterin).—I. Add a mixture of 2 volumes sulphuric (or muriatic) acid and 1 dilute solution of ferric chloride. Violet color.

II. Evaporate with nitric acid to dryness, adding afterwards ammonia. Red color (not altered by fixed alkalies).

686. SCHIFF (sulphurous acid).—Expose mercurous nitrate paper to the vapors. Gray stain.

687. SCHIFF (urca).—Purple color (finally brownish black) on addition of a solution of furfural and muriatic acid.

688. SCHIFF (uric acid). A brown stain on nitrate of silver paper. (The solution must be alkaline.)

689. SCHLAGDENHAUFFEN (alkaloids).—To an aqueous solution of pyrogallic acid add an alcoholic solution of corrosive sublimate. Black color.

690. SCHLAGDENHAUFFEN (alkaloids from glucosides).—Equal parts of an alcoholic 8-per cent solution of guaiacum and a saturated solution of corrosive sublimate. Only alkaloids cause a blue color.

691. SCHLAGDENHAUFFEN (magnesium salts).—Dissolve iodine in a 2-per-cent solution of potassa or soda, till the solution acquires a golden-yellow color. Brownish red color or precipitate.

692. SCHLIENKAMP (nux vomica).—Add a little sulphuric acid, and evaporate. Crimson color; disappears on cooling.

693. SCHLOSSBERGER (textile fibres).—A solution of freshly precipitated protoxide of nickel in ammonia. Dissolves silk.

694. SCHMID (metallic salts).—Solution of phosphorus in bisulphide of carbon; shake with the aqueous solution of the salts. Colored precipitates. See Fresenius, *Zeits. Analyt. Chem.*, 1869, p. 61.

695. SCHMIDT (glucose).—Red color on boiling with an ammoniacal solution of acetate of lead.

696. SCHNEIDER (alkaloids).—Mix with 6 sugar, and add 1 drop of sulphuric acid on top of it. Color reactions. See "Proceedings Am. Pharm. Association," xxi (1873), p. 368.

697. SCHNEIDER (benzoic acid from Siam benzoës).—Add an alkaline solution of permanganate of potassium. Decolorization. Acids from other sources, only a green color.

698. SCHNEIDER (bismuth).—A solution of 3 tartaric acid and 1 stannous chloride in sufficient solution of caustic potassa. Blackish-brown precipitate on heating.

699. SCHOENBEIN (hydrocyanic acid).—I. Soak slips of filtering paper in a 1-per-cent tincture of guaiacum, let dry, and moisten with a $\frac{1}{10}$ -per-cent solution of sulphate of copper. Blue color.

II. A mixture of 5 fresh, defibrinated blood, 45 water and the liquid to be examined, adding lastly a little peroxide of hydrogen. The red color is changed to brown.

700. SCHOENBEIN (blood).—Tincture of guaiacum and oil of turpentine. Blue color.

701. SCHOENBEIN (copper).—Blue color on adding cyanide of potassium and tincture of guaiacum.

702. SCHOENBEIN (nitrous acid in potable water).—I. Add a solution of pyrogallic acid and a little dilute sulphuric acid. Brown color.

II. Add to water sufficient indigo solution to color it a deep blue, add a little muriatic acid, and, while stirring, sufficient potassium pentasulphide till the blue color just disappears. Filter, and add the suspected water or solution of nitrites. Blue color.

703. SCHOENBEIN (peroxide of hydrogen).—I. Blue color on addition of a few drops of iodide of cadmium-starch solution and a little ferrous sulphate.

II. Freshly prepared tincture of guaiacum and a few drops of a cold prepared infusion of malt. Blue color (1:2,000,000).

III. A mixture of a solution of ferric chloride and a solution of (red) ferricyanide of potassium. Blue color (1:10,000,000).

704. SCHOENN (cobalt).—A perfectly neutral solution of sulphocyanide of sodium. Blue color.

705. SCHOENN (molybdic acid). Heat with sulphuric acid, and let cool. Blue color.

706. SCHOENN (peroxide of hydrogen).—A solution of titanic acid. Yellow to deep-red color.

707. SCHOENN (phosphorus).—Heat the dry substance with magnesium ribbon; then add a little water. Evolution of phosphuretted hydrogen.

708. SCHOENN (sulphur).—Heat with sodium, dissolve in water, and add a solution of nitroprusside of sodium. Red color.

709. SCHRAGE (cinchona alkaloids).—Microsulphocyanide test. See "Proceedings Am. Pharm. Association," xxiii (1875), p. 409-411; xxvii (1879), p. 488-492.

710. SCHRAMM (fixed oils in essential oils).—Burn with a wick, and blow it out. Characteristic odor.

711. SCHREITER (glucose).—A mixture of 2 salicylate of sodium, 2 sulphate of copper, 10 soda, 40 water. Red precipitate.

712. SCHUETZENBERGER (anthrachinon).—An alkaline solution of hyposulphite of sodium. Red color.

713. SCHULTZE (alkaloids).—I. Phospho-antimoniate of sodium (= a mixture of 4 of a saturated solution of phosphate of sodium with 1 chloride of antimony). White precipitate.

II. A mixture of chloride of antimony and phosphoric acid. White precipitates. See *Am. Jour. Pharm.*, xxxii (1860), p. 187 and 235.

714. SCHULTZE (differentiation of histological elements).—Nitric acid and a little chlorate of potassium.

715. SCHULZ (salicylic acid).—Green color on addition of a solution of sulphate of copper to a neutral solution of a salicylate.

716. SCHULZE (ammonia).—Solution of chlorinated lime and carbolic acid. Green color.

717. SCHULZE (cellulose).—25 dry chloride of zinc and 8 iodide of potassium dissolved in 8½ water, adding as much iodine as it will dissolve.

718. SCHWABE (quinia).—Solution of cyanide of potassium. Crimson color.

719. SCHWARZENBERG (alkaloids).—Color reactions on treating with nitric acid and ammonia.

720. SCHWEITZER (textile fibres).—Dissolve 10 sulphate of copper in 100 water, add a solution of 5 potassa in 50 water, wash the precipitate, and dissolve it in twenty 20-per-cent ammonia. Dissolves silk, cotton, linen.

721. SEDGWICK (alkaloids).—Best isolated as iodosulphates.

722. SELLE (ammonia).—Alcoholic tincture of the petals of blue hyacinth; dip a strip of filtering paper in it, dry, and expose to the vapors. Green color.

723. SELMI (alkaloids).—A saturated solution of iodic acid in

sulphuric acid, diluted with 6 times its volume of the same acid.
Color reactions.

724. SELMI (free phosphoric acid).—Apply a drop of the liquid (or the dry substance, moistened with sulphuric acid) to the loop of a platinum wire, and hold it close to the lower part of a hydrogen flame. Green color of flame.

725. SELMI (strychnia).—Moisten with a small quantity of a solution of iodic acid in sulphuric acid. Yellow, brick-red, and violet-red.

726. SELMI (morphia).—I. Stir up red oxide of lead for fifteen minutes in glacial acetic acid, and filter. To 1 drop add 2 drops solution of morphia, and evaporate very gently. Slightly yellow to bright-yellow, dark-yellow, violet color.

II. Dissolve in sulphuric acid. Violet color. Saturate next with bicarbonate of sodium, and add tincture of iodine. Green color.

727. SENIER (glycerin).—Dip a borax bead into the slightly alkaline liquid, and expose to a Bunsen flame. Green color.

728. SERULLAS (morphia).—Iodic acid. Red color.

729. SIEBOLD (albumen).—Add to the urine a small excess of ammonia, and then a small excess of diluted acetic acid; heat to boiling. Cloudiness.

730. SIEBOLD (alcohol in chloroform).—Iodine dissolves with a purple color in pure chloroform; presence of alcohol changes the color into reddish brown.

731. SIEBOLD (morphia).—Heat with sulphuric acid, and add perchlorate of potassium (free from chlorate). Brown color.

732. SIEBOLD and BRADBURY (salicylic acid in wine).—Mix the wine with carbonate of potassium to slight alkalinity, add a solution of nitrate of lead in excess, shake, filter, and add a very dilute solution of ferric chloride. Violet color.

733. SIEWERT (molybdic acid).—Add to a very dilute solution of the acid in nitric acid an aqueous solution of xanthogenate (ethylsulphocarbonate) of potassium. Yellow to flesh-colored precipitate, soon turning to violet.

734. SIMON (cinnamic acid).—Add bichromate of potassium and sulphuric acid. Formation of oil of bitter almonds.

735. SKKEY (cobalt).—Citric (or tartaric) acid, ammonia in excess, and (red) ferricyanide of potassium. Dark-red color (1 60:000).

736. SLATER (strychnia).—Sulphuric acid and chlorate of potassium. Maroon-red color.

737. SMITH (free acids).—Freshly precipitated chloride of silver, dissolved in ammonia. A precipitate of chloride of silver.

738. SMITH (biliary matter).—Add tincture of iodine to the urine. Green color.

739. SMITH (santonin).—Heat with nitric acid. Greenish-yellow color; turns deep red with alkalies.

740. SNELLING (emetia).—Pour a few drops of muriatic acid upon a little chlorate of potassium, and then a drop of the suspected liquid. Orange-red color, turning violet.

741. SOLDAINI (glucose).—A solution of 15.0 carbonate of copper in water, mixed with a solution of 416.0 bicarbonate of potassium; add water up to 1400 ccm. Reduction.

742. SONNENSCHEIN (alkaloids).—I. Ceroso-ceric oxide. Dissolve the alkaloid in sulphuric acid, and add a trace of the test. Color reactions. See Fresenius, *Zeits. Analyt. Chem.*, 1870, p. 495, or Hager, *Praxis*, i, p. 207.
II. Phospho molybdic acid. Yellowish precipitate. See Hager, *Praxis*, i, p. 203, or *Am. Jour. Pharm.*, xxx, p. 550.

743. SONNENSCHEIN (protein).—A saturated solution of tungstate of sodium, strongly acidified by acetic or phosphoric acid. Precipitate.

744. SONNENSCHEIN (blood).—Extract the stains with distilled water, and precipitate with a solution of tungstate of sodium, strongly acidified with acetic acid. Ammonia colors it reddish green (fluorescence).

745. SONSTADT (calcium salts).—Tungstate of sodium. Precipitate.

746. SOUTHEY (opium).—Sulpho molybdic acid. Blue color.

747. SPENCE AND ESMILMAN (free mineral acids).—The yellow color of a very dilute aqueous solution of ferric chloride is discharged.

748. SPRENGEL (nitric acid).—A few drops of (a solution of 1 carabolic acid in 4 sulphuric acid and 2 water) are added to a dry nitrate. Reddish-brown color.

749. STAEDELER (purity of chloroform).—Bilirubin dissolves with a yellow color. Green color indicates decomposition.

750. STANFORD (iodine).—Add bisulphide of carbon and 1

drop of nitrosulphuric acid (= sulphuric acid of 1,843 saturated with gaseous nitrous anhydride). Violet color.

751. STAS-OTTO (alkaloids).—Extract with alcohol containing oxalic or tartaric acid; then use alcohol and ether. Scheme, see *Am. Jour. Pharm.*, 1874, p. 120, or *Fresenius, Zeits. Analyt. Chem.*, 1874, p. 72, 73.

752. STEENBUCH (examination of flour).—Get rid of starch-grains by the action of diastase, pour into water, and remove albuminous matter with a weak solution of soda. Examine the residue microscopically.

753. STEFANELLI (alcohol in ether).—Aniline violet. Does not dissolve in pure ether.

754. STEIN (colors and dyes).—Schemes, see:

Blue. *Fresenius, Zeits. Analyt. Chem.*, 1870, p. 128-133.

Green. *Id.* 1871, p. 119-123.

Madder colors. *Id.* 1870, p. 519.

Red. *Id.* 1870, p. 520-523.

Violet. *Id.* 1871, p. 374.

Yellow. *Id.* 1871, p. 115-119.

755. STEIN (narceina).—Add to the liquid a solution of iodides of zinc and potassium, and a drop of an aqueous solution of iodine. Blue color.

756. STEIN (nitric acid).—Heat the salt with litharge, and expose a strip of filtering-paper, moistened with an acid solution of ferrous sulphate, to the gas evolved. Yellow to brown color.

757. STEVENIN (alkalimetry).—Glycerin-extract of the petals of violet or mallow flowers. Acids turn the color red; alkalies, green.

758. STODDART (quinia).—I. Ether, alcohol, soda.

II. Sulphocyanide of potassium.

759. STOKES (quinia).—Fluorescence, see *Am. Jour. Pharm.*, xxx (1858), p. 241.

760. STOLBE (potassium salts).—Fluoboride of sodium (or of ammonium). Crystalline precipitates, which color a Bunsen flame green to finally violet.

761. STORER (chromic acid).—Ethereal solution of peroxide of hydrogen. Intensely blue color.

762. STRASSBURG (biliary matter).—To the urine add a little cane-sugar, moisten a slip of filtering-paper with it, dry, and apply a drop of sulphuric acid. Violet color.

763. STRENG (sodium salts).—Add a solution of uranium acetate. Minute yellow crystals. Examine by polarized light under the microscope.

764. STROHL (free mineral acids in vinegar).—Add a solution of oxalate of ammonium and one of chloride of calcium. In presence of mineral acids no precipitate is formed.

765. STRUVE (peroxide of hydrogen).—An alkaline solution of litharge and a diluted solution of subacetate of lead. Test with iodide of potassium-starch paste and acetic acid. Blue color. (Takes several hours.)

766. STRUVE (analysis).—By dialysis, using a bladder, and substituting chloroform water for the surrounding liquid.

767. STUART (alcohol in essential oils).—Distil off the alcohol, add compound tincture of iodine (U. S. Ph.) and solution of potassa. Formation of iodoform.

Sulzer—see *Salzer*.

768. SVANBERG (phosphoric acid).—A solution of molybdate of ammonium in large excess. Yellow precipitate.

769. TANRET (albumen).—Iodide of potassium 3.32, corrosive sublimate 1.35, acetic acid 20 ccm., water 64 ccm. White precipitate.

770. TASSINARI AND PIAZZA (nitric acid).—Potassa and zinc dust. Formation of ammonia.

771. TATTERSALL (cobalt).—Add a solution of cyanide of potassium till the precipitate is redissolved; add a few drops of yellow ammonium sulphhydrate. Blood-red color.

772. TATTERSALL (delphinia).—Rub with malic acid, and then with a few drops sulphuric acid. Orange color, turning pink, then violet.

773. TATTERSALL (morphia).—Dirty violet (afterwards sea-green) color on dissolving in sulphuric acid and adding a little arseniate of sodium.

774. TATTERSALL (papaverina; codeia).—Dissolve in sulphuric acid, and add a little arseniate of sodium; heat. Red to violet color; addition of water and an excess of soda turns the color nearly black. (Papaverina.)

Dark blue; addition of water and excess of soda turns to orange. (Codeia.)

775. TAUFFFLIER (arsenic).—Preliminary treatment with a solution of oxide of zinc in potassa (or with a solution of sulphate of

zinc, adding carbonate of potassium or sodium in excess). Zinc combines with the organic substance.

776. TRICHHMANN (blood).—2 to 8 ccm. aqueous solution mixed with a few drops glacial acetic acid and about 0.01 chloride of sodium; a few drops are spread on a slide, let evaporate, and examined with the microscope. Hæmin-crystals.

777. TERREILL (cellulose).—Dip into a 1-per-cent solution of iodide of potassium, dry, immerse into sulphuric acid, rinse in water. Blue color. (Shows blue and red globules under the microscope.)

778. TESSIER (iodine in presence of tannin).—Liberate it by addition of tincture of chloride of iron, and test with starch paste paper. Blue color.

779. TEUBNER (mercury).—Heat the substance in a crucible, and let the vapors strike a small spot on a cold gold plate. White stain.

780. THOMAS (strychnia in presence of morphia).—Makes use of the property of solution of potassa to dissolve morphia but not strychnia, and of chloroform to dissolve strychnia but not morphia.

781. THOMPSON (theina).—Pass a current of eucchlorine (= hypochlorous acid) through a solution of theina, and evaporate. Blood-red residue.

782. THOMSON (iodine).—Pass chlorine through the liquid, and test with starch paste. Blue color.

783. THRESH (alcohol).—Convert it into aldehyde by distilling off 20 ccm. from 100 ccm. of the liquid with 2 ccm. saturated solution of bichromate of potassium and 8 ccm. diluted (1:1) sulphuric acid, then add 3 ccm. of solution of soda, boil a few seconds, and let cool. Yellow color.

784. THRESH (alkaloids).—I. 4.68 oxide of bismuth; dissolve in 80 ccm. muriatic acid, and add water up to 800 ccm. Dissolve 20 iodide of potassium in water up to 700 ccm.; mix the two solutions. Add the test drop by drop to the solution of the alkaloid. Reddish-brown precipitate.

II. Liquor bismuthi Ph. Br. 1 oz., iodide of potassium 1½ drachms, muriatic acid 1½ drachms. Mix.

785. THRESH (bismuth).—Add a little muriatic acid to the suspected liquid, and a little iodide of potassium. Orange-red to yellow color (1:100,000).

786. THRESH (free sulphuric acid in vinegar).—When a known

quantity of a solution of chloride of barium is added to a solution containing sulphates and free sulphuric acid, the liquid evaporated and ignited, there will be a loss of chlorine equivalent to the amount of free sulphuric acid present.

787. TIDY (albumen).—I. Equal volumes of carbolic and glacial acetic acids (if a drop mixes turbidly with water, add more acetic acid). White precipitate (1 : 15,000).

II. Add to the urine 15 drops alcohol, and then 15 drops carbolic acid. White precipitate.

788. TILDEN (iodine).—Liberate by permanganate of potassium. Test as most convenient.

789. TOLLENS (aldehyde).—A solution 3 nitrate of silver in 30 ammonia, add 3 caustic soda in 30 water. Silver mirror (1 : 10,000).

790. TOMLINSON (oils).—Let a drop fall from a certain definite height upon the surface of perfectly pure water. Characteristic films (= cohesion-figures). See *Am. Jour. Pharm.*, xxxvi (1864), p. 248, 343.

791. TOMMASI (carbolic acid).—Dip a pine shaving first into the liquid to be examined, then into diluted muriatic acid containing chlorate of potassium (50.0 muriatic acid, 50.0 water, 0.20 chlorate of potassium), and expose to the rays of the sun. Blue color.

792. TRAPP (veratria).—Heat cautiously with muriatic acid. Dark-red to dark-violet color.

793. TRAUBE (peroxide of hydrogen).—Add to 6 ccm. of the liquid sulphuric acid and iodide of zinc-starch paste, then 2 drops of a 2-per-cent solution of sulphate of copper, and finally a little $\frac{1}{4}$ -per-cent solution of ferrous sulphate. Blue color.

794. TREUMANN (theobromia).—Evaporate to dryness a mixture of theobromia and chlorine water, then add ammonia. Purple color.

795. TROMMER (glucose).—Add 1 to 2 drops of a solution of sulphate of copper to the urine, then 4 to 5 ccm. solution of carbonate of sodium. Reduction.

796. TROMMSDORFF (nitrous acid).—Sulphuric acid and iodide of potassium-starch paste. Blue color.

797. TROTARELLI (ptomaines).—Addition of sodium nitro-prusside and then palladium nitrate to the sulphate of the ptomaines. Color reactions.

798. TSCHIRCH (analysis).—Microchemical reactions. See *Journal Chem. Soc.*, 1883, p. 876, or *Pharm. Journal and Trans.*, 1883 (March), p. 739.

799. TURNER (borax).—Mix with (9 bisulphate of potassium and 1 fluorspar), and treat before the blowpipe. Green color.

799 bis. UFFELMANN (nitric acid).—To a small piece of diphenylamine add 1.5 ccm. sulphuric acid in a porcelain capsule, stir till a very pale pink color is produced. Add 3 or 4 drops of the liquid to be tested. Blue color.—*Pharm. Record*, 1885, p. 126.

800. ULTYMANN (biliary matter).—Add to 10 ccm. of the urine 3 to 4 ccm. of a solution of potassa (1:3), and acidify with muriatic acid. Emerald-green color.

801. USLAR AND ERDMANN (alkaloids).—Extract with water containing muriatic acid; use sand, ammonia, then fusel-oil. See *Prescott, Organ. Analysis* (1874), p. 133, or *Am. Jour. Pharm.*, xxxiv (1862), p. 354.

802. VALENTE (fixed oils).—Different solubility in glacia acetic acid. See *Journal Chem. Soc.*, 1884, p. 1079.

803. VALSER (alkaloids).—Iodides of mercury and potassium. Precipitates. See *Am. Jour. Pharm.*, xxxvi (1864), p. 438.

804. VIDAN (sugar).—Equal volumes of sesame oil and muriatic acid; heat to boiling; add the suspected liquid. Pink color.

805. VIOLETTE (glucose).—Similar to *Fehling's*.

806. VITALI (alkaloids).—I. Evaporate to dryness with fuming nitric acid, and add 1 drop of an alcoholic solution of potassa. Color reactions.

II. Sulphuric acid and chlorate of potassium. Color reactions in presence of an alkaline sulphide.

807. VITALI (morphia).—Dissolve in sulphuric acid, add 2 drops of solution of sodium sulphide; heat cautiously. Flesh color, violet, dark green.

808. VITALI (atropia).—Add a drop of fuming nitric acid to the dry alkaloid (or salt), and let dry on a water-bath. When cold, moisten with a drop of an alcoholic solution of potassa. Violet color, which soon passes into a fine red (0.000,001 gram).

809. VITALI (biliary matter). Add to the urine a solution of bisulphate of quinia, neutralize with ammonia, take up with sulphuric acid, add a crystal of sugar and a little alcohol. Violet color.

810. VITALI (chloroform).—I. Pass a current of hydrogen

through the suspected liquid, and then through a glass tube. Ignite, and hold a piece of fine copper wire in the flame. Intense blue color.

II. Pass the gas (as above) into a mixture of solution of potassa and thymol. Red color.

811. VITALI (fusel-oil).—Pour the liquid on top of sulphuric acid, stir gently. Color reactions (red to finally green).

812. VITALI (thymol).—Distil off, and pass the vapors into a mixture of chloroform and solution of potassa. Red color.

813. VOGEL (alcohol in chloroform).—Shake with potassa, and apply to a piece of moistened red litmus-paper. Blue color.

814. VOGEL (bisulphide of carbon).—Add to the liquid an alcoholic solution of potassa, and then a solution of sulphate of copper. Lemon-yellow precipitate.

815. VOGEL (ferric salts).—Salicylic acid in not too strongly acid solutions. Violet color.

816. VOGEL (glucose).—Boil with a few drops of litmus solution. Decolorization.

817. VOGEL (narceia).—Chlorine water and a few drops of ammonia. Blood-red color, which does not disappear on addition of an excess of ammonia.

818. VOGEL (nitric acid in potable water).—To 15 ccm. of the water add a little pure gold-leaf and a few drops of pure muriatic acid. Boil, filter, and test for gold with stannous chloride. Red-violet color.

819. VOGEL (quinia).—Mix with chlorine water, and add finely powdered ferrocyanide of potassium. Pink to deep-red color.

820. VOGEL (tannin).—Chlorine water and a few drops ammonia. Blood-red color.

821. VOGEL (oil of turpentine in essential oils).—Add 5 drops of the oil to 1 drop sulphuric acid. Color altered.

822. VOGEL (free sulphuric acid in vinegar).—Chlorate of potassium. Evolution of chlorine.

823. VOHL (sulphur).—Mix 1 volume water with 2 glycerin, saturate with slaked lime and freshly prepared hydrate of lead; decant the clear liquid. Black color on heating with the substance.

824. DE VRIJ (alkaloids).—Phosphomolybdic acid. Precipitates.

825. DE VRIJ (purity of quinidia).—Dissolve 2 quinidia in 100

hot water, and add 1 iodide of potassium. If pure, the precipitate is sandy; if not, more or less resinous.

826. DE VRIJ (purity of quinina).—I. Heat 1 chinoidin with 2 benzole on a water-bath. After cooling, decant the clear, and shake with a small quantity of diluted (1:10) sulphuric acid. Pour into a porcelain dish, and add a solution of (1 iodine, 2 iodide of potassium, 50 water) in such a way that at no time the chinoidin comes in contact with an excess of iodine.

II. 2 sulphate of chinoidin dissolved in 8 5 per-cent aqueous sulphuric acid, cautiously precipitated with iodine solution (= 1 iodine, 2 iodide of potassium, 100 water). The resinous precipitate washed, dried, dissolved in six times its weight of strong alcohol, filtered, evaporated, and again dissolved in five times its weight of alcohol. See "Proceedings Am. Pharm. Association," xxiv (1876), p. 348-9, or *Pharm. Journal and Trans.*, 1875 (Dec.), p. 461.

827. WAGNER (eosine).—Color discharged by collodium.

828. WALZ (fixed oils in essential oils).—A syrupy solution of terchloride of antimony. Color reactions.

829. WARTHA (anthrachinon).—Heat with solution of potassa and a little alcohol. Green to bluish-purple color.

830. WARTHA (sulphur in illuminating gas).—Move a soda bead along the outer part of the flame, and then hold it for one minute in the luminous part of it. Crush the bead on a porcelain tile, and add a drop of nitroprusside of sodium. Red color.

831. WATSON (gallic acid).—Dissolve in water, add ammonia and muriatic acid. Red color.

832. WATSON (tannin).—Dissolve in water, add ammonia and nitric acid. Purple color.

833. WATSON (pyrogallic acid).—Dissolve in water, and add ammonia. Lemon-yellow color.

834. WEBER (indican).—Heat 30 ccm. of the urine to boiling with 30 ccm. muriatic acid, let cool, and shake with ether. Blue foam; red color of the ether.

835. WEISKE (alkalimetry).—Add to a solution of salicylic acid in water a few drops of solution of ferric chloride. To the deep violet-colored solution add cautiously a diluted solution of soda till exact neutralization (yellowish-red color). Add of this test a few cubic centimetres to the acid solution to be examined, and neutralize as usual with normal soda solution. As soon as per-

fect neutralization is reached, the hitherto colorless liquid acquires a deep-violet color, which disappears on adding the smallest excess of alkali.

836. WELLCOME (morphia).—Chlorinated lime. Red color.

837. WELLER (titanium).—Add a few drops of peroxide of hydrogen to a solution of titanic acid in sulphuric acid. Orange-red to yellow color.

838. WELLER (vanadium).—Add a few drops of peroxide of hydrogen to an acid solution of an alkaline vanadate. Deep-red to rose-red color.

839. WELTZIEN (peroxide of hydrogen).—A mixture of solution of ferric chloride and solution of (red) ferricyanide of potassium. Blue color.

840. WENZELL (strychnia).—A solution of 1 permanganate of potassium in 2000 sulphuric acid. Color reactions (1:900,000).

841. WEPPEN (morphia).—Sugar, sulphuric acid, and bromine water. Red color.

842. WEPPEN (veratria).—Sugar and sulphuric acid. Light-yellow to dark-green and dark-blue color.

843. WERBER (nitroglycerine).—Extract with ether or chloroform, mix with a couple of drops of aniline, evaporate, add a few drops sulphuric acid. Purple to dark-green color.

844. WHARTON (mineral acids in vinegar).—Add a little sugar, evaporate to syrupy consistence, add chlorate of potassium, and stir a couple of minutes. Ignition and odor of chlorine.

845. WIESNERS (cellulose).—Red or violet coloration on moistening paper or the microscopical section with a $\frac{1}{4}$ -per-cent phloro-glucin solution, afterwards treating with muriatic acid. A solution of sulphate of aniline (which colors yellow) is also called Wiesner's test.

846. WILDENSTEIN (copper; iron).—Alcoholic tincture of log-wood. Blue color.

847. WILEY (chlorochromic acid).—Add to 1 drop sulphuric acid a small crystal of strychnia, and stir with a glass rod moistened with chlorochromic acid. Blue-violet.

848. WILLIAMS (essential oils).—A strip of filtering-paper moistened with a dilute alcoholic solution of acetate of lead, and dried in an atmosphere of sulphuretted hydrogen. Let a few drops of the oil fall upon it, and put it away in a dry place for

five or more hours. Bleached or not bleached. See Prescott, Organ. Analysis (1874), p. 114.

849. WIMMER (purity of olive-oil).—Pass nitrous acid gas through the oil.

850. WINCKLER (alkaloids).—A solution of corrosive sublimate in excess of iodide of potassium. White precipitates.

851. WINKLER (water in alcohol).—Chloride of cobalt. The blue color turns red.

852. WINKLER (iodine).—Nitrite of sodium and starch paste. Blue color.

853. WINKLER (kinovic acid).—Solution of sulphate of copper. Dirty green color and precipitate.

854. WITTSTEIN (bitter substances).—See "Proceedings Am. Pharm. Association," xxiii (1875), p. 340.

855. WITTSTEIN (tarry matter in ammonia).—Supersaturate with not too concentrated nitric acid. Brownish-red color.

856. WITTSTEIN (foreign starch in chocolate).—Boil and filter. Test filtrate with iodine. The natural starch does not pass through the filter.

857. WRRZ (mineral acids in vinegar).—Methylaniline violet. Add 2 drops to 25 ccm. vinegar. Turns the violet to blue or green color (1 : 10,000).

858. WOEHLER (phosphorus).—Place the suspected liquid in a Marsh's apparatus. Formation of phosphuretted hydrogen. Ignite, and let the flame strike against a porcelain plate. Green color of the flame.

859. Woodcock (alkaloids).—Dialyse by means of gelatine jelly, and examine the alkaloids, isolated in this way.

860. WORMLEY (free sulphuric acid).—Add a little veratria, and evaporate to dryness on a water-bath. Crimson color.

861. WORMLEY (alkaloids).—I. Alcoholic solution of picric acid. Yellow amorphous or crystalline precipitates. Extract with alkali, chloroform, benzole, etc. See Prescott, Organ. Analysis (1874), p. 142, 3.

II. A solution of 1 iodine, 3 iodide of potassium, and 60 water. Colored precipitates. See Prescott, p. 144.

862. YOUNG (gallic acid).—A solution of cyanide of potassium. Red color, which disappears soon, but reappears on vigorous shaking.

863. YVON (purity of chloroform).—A solution of 1 permanga-

nate of potassium, 10 potassa, in 250 water. Green color indicates impurity.

864. YVON (alkaloids).—Boil 3 grams subnitrate of bismuth with 40 water, add 14 iodide of potassium and 40 drops muriatic acid. Red color.

865. ZECHINI (purity of olive-oil).—Colorless nitric acid (1,40). Color reactions.

866. ZEISE (bisulphide of carbon).—Add a little alcoholic solution of potassa and solution of sulphate of copper. Yellow precipitate.

867. ZELLER (quinia).—Thalleioquin reaction, substituting bromine water (1: 40) for chlorine water.

868. ZETTKNOW (analysis).—Without the use of sulphuretted hydrogen and ammonium sulphide. See Chandler's *American Chemist*, iii (1878), p. 452.

869. ZIEGLER (arsenious and sulphurous acids in muriatic acid).—Generate hydrogen gas from the suspected acid and zinc; pass the gas first through water containing a few drops of ammoniacal solution of chloride of copper, and then through water containing 1 drop solution of nitrate of silver. Characteristic color reactions: the copper solution showing sulphurous acid, and the silver solution showing arsenious acid.

870. ZIMMER (purity of quinia and quinidina).—Ether, ammonia. See *Am. Jour. Pharm.*, xxiv (1852), p. 266, or Wiegand's edition of Parrish, or Dispensaries.

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- in Chloroform, 50, 211, 316, 730, 813 (Blachez, Fleischmann, Hardy, Siebold, Vogel).
- in ether, 223, 753 (Frederking, Stefanelli).
- in essential oils, 19, 86, 67, 77, 145, 176, 183, 211, 238, 448, 520, 562, 637, 642, 676, 767 (Barbier, Bernouilli, Boettger, Borsarelli, Davy, Dragendorff, Drechsler, Fleischmann, Hager, Leonhardi, McClellan Forney, Oberdoerffer, Puscher, Redwood, Salzer, Stuart).
- in Peru balsam, 245 (Gawalowski).
- test for fusel-oil, 42, 88, 298, 395, 811 (Betelli, Bouvier, Hager, Jorissen, Vitali).
- test for methylic alcohol, 124 (Cazeneuve and Cotton).
- ALCOHOL, ABSOLUTE**, test for water, 123, 133, 152, 495, 851 (Casoria, Claus, Debrunner, Mann, Winkler).
- ALDEHYDE**, 460, 789 (Liebig, Tollens). —— in sweet spirits of nitre, 263 (Golding-Bird).
- ALDEHYDES**, 600 (Penzold and Fischer).
- ALKALIES**, 14, 204, 273, 380 (Bachmeier, Filhol, Griesmayer, Jacquemin). See also **ALKALIMETRY**.
- ALKALIMETRY**, 58, 76, 154, 210, 232, 246, 333, 362, 432, 480, 483, 484, 503, 506, 532, 566, 594, 677, 757, 885 (Boettger, Borntraeger, Degener, Fittig, Frébault, Gawalowski, de Henry, Hoffmann, Langbeck, Luck, Lunge, Lux, Marsh, Maschke, Miller, Oser and Kalmann, Pellagri, Schaal, Stevenin, Weiske).
- ALKALOIDS**, 11, 51, 52, 79, 105, 143, 155, 166, 190, 193, 194, 230, 239, 260, 265, 266, 268, 280, 290, 312, 327, 365, 369, 381, 393, 416, 438, 449, 465, 494, 502, 511, 518, 560, 570, 577, 610, 625, 657, 659, 660, 684, 689, 696, 718, 719, 721, 723, 742, 751, 784, 801, 803, 806, 824, 850, 859, 861, 864 (Arnold, Bloxam, Blyth, Bouchardat, Buckingham, Czumpelitz, Delffs, Dragendorff, Eboli, Erdmann, Erdmann and Ustar, Fraude, Froehde, Godeffroy, Graham, Graham and Hoffmann, Grandea, Guy, Hager, Hamlin, Jr., Helwig, Horsley, How, Jacquemin, Jorissen, Koehler, Langley, Lepage, Lindo, Mangini, Marmé, Maschke, Mayer, Nowak and Kratzschmar, Otto-Stas, Palm, Planta, Prescott, Robin, Rodgers and Gridwood, Scheibler, Schering, Schlagdenhauffen, Schneider, Schultze, Schwarzenberg, Sedgwick, Selmi, Sonnenschein, Stas-Otto, Thresh, Ustar and Erdmann, Valser, Vitali, de Vrij, Winkler, Woodcock, Wormley, Yvon).
- distinction from glucosides, 690 (Schlagdenhauffen).
- ALOES**, 75 (Borntraeger).
- ALON**, 355 (Histed).
- AMMONIA**, 59, 72, 129, 191, 282, 291, 423, 456, 534, 716, 723 (Boettger, Bohlig, Chevreul, Einbrodt, Guyot, Hager, Kroupa, Lex, Moddermann, Schulze, Selle).
- test for tarry matter, 164, 494, 855 (Donath, Kupferschlaeger, Wittstein).
- AMMONIUM SALTS**, 308, 553 (Hager, Nessler).
- AMYGDALIN**, 243 (Heuschen).
- ANALYSIS**, Blowpipe, 427 (Landauer). —— Dialysis, 766 (Struve). —— “Drop,” 232 (Hager). —— Hyposulphite of ammonium, 565 (Orlowski). —— “Kramato,” 238 IV (Hager). —— Microchemical, 796 (Tschirch). —— of Planta, 585 (Parsons). —— Test-paper, 536 (Mohr). —— without Sulphuretted hydrogen, 868 (Zettnow).
- ANILINE**, 186, 360, 382, 452, 668 (Duflos, Hoffmann, Jacquemin, Letheby, Runge).

ANTHRACHINON, 712, 839, (Schuetzenberger, Wartha).

APOMORPHIA, 30 (Bedson).

ARBUTIN, 400 (Jungmann).

ARSENIC, 40, 48, 84, 107, 146, 212, 236, 244, 293, 344, 349, 374, 391, 453, 504, 516, 543, 647, 775 (Berzelius, Bettendorff, Braconnot, Cadet, Davy, Fleitmann, Fresenius and Babo, Gatehouse, Hager, Hilger, Himmelmann, Hume, Johnson, Letheby, Marsh, Mayengon and Bergeret, Morton, Reinsch, Taufflier). See also ACID, ARSENIOUS.

— in alkaline salts, 588 (Patrouillard). — in green colors, 635 (Puscher). — in muriatic acid, 298, 568, 869 (Hager, Oster, Ziegler).

ASPIDOSPERMIA, 231 (Fraude).

ATROPIA, 253, 388, 351, 808 (Gerrard, Herbet, Hinterberger, Vitali).

BALSAMS, 353 (Hirschsohn).

BARBALOIN, 355 (Histed).

BASES, VOLATILE, 517 (Meyer).

BENZIDIN, 399 (Julius).

BENZINE, BENZOLE, 46, 86, 167, 357, 634 (Biel, Brandberg, Dragendorff, Hoffmann, Pusch).

BERBERINA, 412, 601 (Klunge, Perrins).

BICROMATES, in presence of chromates, 161 (Donath).

BILARY MATTER, 96, 121, 141, 181, 252, 258, 501, 512, 555, 559, 589, 603, 662, 738, 762, 800, 809 (Bruecke, Casali, Cunisset, Drechsel, Gerhardt, Gmelin, Maréchal, Masset, Neukomm, Noel, Paul, Pettenkofer, Rosenbach, Smith, Strassburg, Ulitzmann, Vitali).

BISMUTH, 208, 414, 545, 698, 785 (Field, Kobell, Muir, Schneider, Thresh).

BISULPHIDE OF CARBON, 363, 814, 866 (Hoffmann, Vogel, Zeise). — in essential oil of mustard, 481 (Luck).

BITTER SUBSTANCES, 168, 284, 854 (Dragendorff, Haffstedt, Wittstein).

BLOOD, 5, 153, 175, 372, 700, 744, 767 (Almén, van Deen, Dragendorff, Huenefeld, Schoenbein, Sonnenschein, Teichmann).

— test for nitrous acid, 89 (Bertoni and Raymondi).

BORAX, 799 (Turner).

BROMIDES, 47, 392 (Bills, Jones).

BROMINE in organic substances, 32 (Bellstein). — in water, 332 (Henry and Humbert).

— test for iodine, 398 (Jorissen).

BRUCIA, 186, 189, 214, 261, 294, 595 (Cotton, Dragendorff, Flueckiger, Gerhardt, Hager, Peillagli).

BUTTER, purity, 140 (Crook).

CAFFEINE, 156, 658 (Delffs, Rochleder).

CALCIUM SALTS, 746 (Sonstadt).

CANNABIS INDICA, extract, 639 (Procter, Jr.).

CELLULOSE, 717, 720, 777, 845 (Schulze, Schweizer, Terreill, Wiesner).

CELOLAR HYDRATE, 199, 563 (Fairthorne, Ogston).

CHLORATES, 86, 885 (Braun, Heppé).

CHLORIDES, 392 (Jones).

CHLORINE, 654 (Riley). — in organic substances, 32 (Bellstein).

CHLOROFORM, 338, 810 (Hoffmann, Vitali).—purity, 749, 868 (Staedeler, Yvon).—in essential oils, 289 (Hager).
 — test for alcohol, 50, 211, 316, 730, 818 (Blachez, Fleischmann, Hardy, Siebold, Vogel).

CHOCOLATE, test for foreign starch, 856 (Wittstein).

CHOLESTERIN, 674, 685 (Salkowski, Schiff).

CHROMATES in presence of bichromates, 160 (Donath).

CINCHONA ALKALOIDS, 78, 189, 281, 498, 586, 709 (Bouchardat, Dwars, Godefroy, Marchand, Pasteur, Schrage. See also QUINIA).

CINCHONA BARKS, 287 (Grahe).

COBALT, 581, 704, 735, 771 (Papasogli, Schoenn, Skey, Tattersall).

CODEIA, 340, 774 (Hesse, Tattersall).

COLCHICIA, 216 (Flueckiger).

COLORS and DYES, aniline, 44 (Bibanow).—Resorcinol, 34 (Benedikt).—in general, 390 (Joffre).—Blue, green, madder, red, violet, yellow, 754 (Stein).

CONIA, 461 (Liebig).

COPAIVA in urine, 558 (Nobel).
 — test for gurjun balsam, 222 (Flueckiger).—for oil of turpentine, 296 (Hager).—for fixed oils, 250 (Gerber).

COPPER, 88, 112, 138, 192, 682, 701, 846 (Bellamy, Campani, Cresti, Endemann and Prochazka, Purgotti, Schoenbein, Wildenstein).
 — in olive-oil, 108 (Cailletet).

COTTON in woollen, 573 (Overbeck). See also TEXTILE FIBRES.

COUMARIN, 336 (Heppé).

CREASOTE, 181, 217, 237, 263, 542, 640, 671 (Clark, Flueckiger, Frisch, Gorup-Besanez, Morson, Read, Rust).

CURARIN, 218 (Flueckiger).

DELPHINIUM, 772 (Tattersall).

DEXTRINE, 297, 473 (Hager, Lipp).

DIGITALINE, 219, 289 (Flueckiger, Grandean).

DYES—see COLORS.

ELATERINE, 466, 621 (Lindo, Power).

EMETIA, 613, 622, 740 (Podwyssotski, Power, Snelling).

EOSIN, 16, 827 (Baeyer, Wagner).

ERGOT in rye flour, 60 (Boettiger).
 ETHER, test for alcohol, 283, 733 (Frederking, Stefanelli).—test for water, 62, 549, 661 (Boettiger, Napier, Romei).

EUPHORBIUM, 220 (Flueckiger).

FERRIC SALTS, 619, 815 (Porret, Vogel).

FLOUR, source, 752 (Steenbuch).—in starch, 63 (Boettiger).
 — test for mineral substances, 348, 439 (Himly, Lassaigne).

FRANGULIN, 608 (Phipson).

FUCHSINE in fruit-juices, 636, 660 (Fuscher, Romei).—in wine, 125, 248, 587, 624 (Chancel, Geissler, Pasteur and Wurtz).

FUSEL-OIL in alcohol, 42, 88, 298, 395, 811 (Betelli, Bouvier, Hager, Jorissen, Vitali).

GELATINE, 116 (Carey Lea).

GLUCOSE, 23, 26, 61, 91, 97, 110, 113, 115, 122, 185, 201, 229, 240, 286, 311, 324, 326, 366, 413, 425, 447, 467, 476, 477, 508, 515, 519, 539, 546, 561, 591, 598, 597, 617, 623, 643, 673, 695, 711, 741, 795, 805, 816 (Barfoed, Barreswil, Boettger, Braun, Bruecke, Caillau, Campani, Cappazuoli, Casamayor, Dudley, Fehling, Franqui and van de Vyvere, Frommherz, Hager, Haines, Heinrich, Heller, Horsley, Knapp, La Grange, Lehmann, Lex, Lindo, Loewe, Loewenthal, Maschke, Maumené, Mazzara, Moore, Mulder, Nylander, Peligot, Pellet, Pollacci, Power, Reich, Sachsse, Schmidt, Schreiter, Soldaini, Trommer, Violette, Vogel).

GLUCOSIDES, 99 (Brunner).

GLYCERINE, 21, 165, 646, 727 (Barbsche, Donath and Mayrhofer, Reichl, Senier).

— test for sugar, 810 (Hager).

GLYCOCOLL, 364 (Horsford).

GOLD, 144, 404 (Darton, Kern).

GUM ARABIC, 437, 645 (Lasseigne, Reiche).

GURJUN BALSAM in copaiva, 222 (Flueckiger). — in urine, 558 (Nobel).

HISTOLOGY, 714 (Schultze).

HYPOSULPHITES, 119, 320 (Carey Lea, Haugk).

INDICAN, 318, 834 (Hammarsten, Weber).

INDICATORS. See **ALKALIMETRY**.

INOSIT, 681 (Scherer).

IODATES in iodides, 135, 618, 683 (Corne, Pollacci, Schering). See also **ACID, IODIC**.

IODIDES, 329, 392 (Hempel, Jones).

IODINE, 2, 118, 128, 205, 270, 331, 384, 417, 434, 488, 489, 496, 572, 599, 628, 639, 649, 750, 782, 788, 852 (Alfraise, Carey Lea, Chatin and Gaultier de Claubry, Filhol, Grangé, Henry, Jacquemin, Koettstorffer, Laronde, Lassaigne, Maier, Marchand, Overbeck, Peloggio, Price, Rabourdin, Reynoso, Stanford, Thomson, Tilden, Winkler).

— in bromine, 393 (Jorissen). — in organic substances, 32 (Beilstein). — in presence of tannin, 778 (Tessier). — in urine, 317 (Harnack). — in water, 332 (Henry and Humbert).

IODOFORM, 283 (Guyot).

IRON, 10, 33, 435, 846 (Andreasch, Bellamy, Lasaulx, Wildenstein).

JALAP, purity of resin, 104 (Buchner).

LEAD in tin 54, 227 (Bobierre, Fordos). — in potable water, 53 (Blyth).

— test for silver, 423 (Krutwig).

LITHIUM SALTS, 308 (Hager).

MAGNESIUM SALTS, 451, 691 (Lepel, Schlagdenhauffen).

MANGANESE, 64, 114, 148, 281 (Boettger, Campani, Davy, Guyard).

MENTHOL, test for thymol, 198 (Eykmann).

MERCURY, 195, 525, 540, 690, 779 (Eschka, Merget, Morgan, Procter, Jr., Teubner).

- in organic substances, 482 (Ludwig). — in urine 241 (Fuerbringer).
- METALLIC SALTS, 694 (Schmid).
- MINERAL SUBSTANCES in organic powders, 348, 439 (Himly, Lassaigne).
- MOLYBDENUM, 509 (Maschke). See also ACID, MOYBDIC.
- MORPHIA, 200, 277, 367, 375, 396, 408, 409, 445, 468, 548, 569, 596, 656, 726, 728, 781, 773, 807, 836, 841 (Fairthorne, Grove, Horsley, Husemann, Jorissen, Kalbrunner, Kieffer, Lefort, Lindo, Nadler, Otto, Pellagri, Robiquet, Selini, Serullas, Siebold, Tattersall, Vitali, Wellcome, Weppen).
- in quinia, 341, 388 (Hesse, Jassy).
- test for apomorphia, 30 (Bedson).
- MUSK, purity, 41 (Berzelius).
- MYRRH, purity, 74, 633 (Bonastre, Righini).
- NARCEINA, 172, 755, 817 (Dragendorff, Stein, Vogel).
- NARCOOTIA, 137 (Cougère).
- NATALOIN, 335 (Histed).
- NICKEL, 92, 582 (Braun, Papasogli).
- NICOTIA, 578 (Palm).
- NITROBENZOL in alcoholic beverages, 151 (Debrunner). — in oil of bitter almonds, 28, 81, 100, 173, 306, 330, 385, 488, 592 (Bechamps, Bourgoin, Brunner, Dragendorff, Hager, Henninger, Jacquemin, Maisch, Pegna).
- NITROGEN, 440 (Lassaigne).
- NITROGLYCERINE, 538, 843 (Mohr, Werber).
- NUX VOMICA, 692 (Schlienkamp).
- OIL OF BITTER ALMONDS, test for nitrobenzol—see NITROBENZOL.
- OIL, CASTOR, in essential oils, 180 (Draper).
- OIL CLOVES, test for carbolic acid, 215, 388 (Flueckiger, Jacquemin).
- OIL, COD LIVER, purity, 530 (Meyer).
- OIL, CROTTON, in other oils, 490 (Maisch).
- OIL OF CRUCIFERAE, 271, 531 (Gréhault, Mialhe).
- OIL, LINSEED, purity, 541 (Morrell).
- OIL, MUSTARD-SEED, test for bisulphide of carbon, 481 (Luck).
- OIL, OLIVE, purity, 20, 29, 31, 80, 85, 108, 133, 134, 157, 259, 420, 426, 472, 497, 620, 665, 849, 865 (Barbot, Bechi, Behrens, Boudet, Bradford, Buchheister, Codina y Laenglin, Conroy, Diesel, Gobel, Kopp, Laillier, Lipowitz, Marchand, Poutet, Roth, Wimmer, Zechini).
- test for copper, 108 (Cailletet).
- OIL PEPPERMINT, 234, 889, 879 (Flueckiger, Jahn, Schack).
- OIL ROSE, purity, 243, 279 (Ganswindt, Guibourt).
- OIL ROSE-GERANIUM, purity, 887 (Jaillard).
- OIL TURPENTINE in copaiva, 296 (Hager). — in essential oils, 177, 487, 520, 527, 821 (Dragendorff, Maier, McClellan Forney, Mero, Vogel).
- OIL VALERIAN, 225 (Flueckiger).
- OILS, 790 (Tomlinson).
- OILS, ESSENTIAL, 178, 179, 288, 308, 321, 334, 431, 491, 848 (Dragendorff, Dragendorff and Kossov, Flueckiger, Hager, Hehn, Heppé, Langbeck, Maisch, Williams).
- test for alcohol, 19, 36, 67, 77, 145, 176, 182, 211, 228, 448, 520, 562, 637, 642, 676, 767 (Barbier, Bernoulli, Boettger, Borsarelli, Davy, Dragendorff,

Drechsler, Fleischmann, Hager, Leonhardi, McClellan Forney, Oberdoerffer, Puscher, Redwood, Salzer, Stuart).

— test for castor-oil, 180 (Draper).— for chloroform, 289 (Hager).— for fixed oils, 650, 710, 828 (Rhien, Schramm, Walz).— for oil of turpentine, 177, 487, 520, 527, 821 (Dragendorff, Maier, McClellan Forney, Mero, Vogel).— for water, 456 (Leuchs).

OILS, FIXED, 46, 111, 256, 304, 322, 513, 514, 557, 802 (Bieber, Calvert, Glaessner, Hager, Heidenreich, Massie, Maumené, Nicklès, Valenta).

— purity, 529 (Merz).

— in copaiba, 250 (Gerber).— in essential oils, 650, 710, 828 (Rhien, Schramm, Walz).

— test for free acids, 378, 666 (Jacobsen, Ruempler).

OPIUM, 196, 524, 567, 746 (Everitt, Merck, O'Shaughnessy, Southey).

OXYGEN, free, 475 (Loew).

OZONE, 68 (Boettger).

PAPAVERIN, 8, 774 (Anderson, Tattersall).

PARAFFINS in wax, 430 (Landolt).

PARATOLUIDIN, 441, 668 (Lauth, Rosenstiehl).

PEPTONES, 1, 264 (Adamkiewicz, Gorup-Besanez).

PEROXIDE OF HYDROGEN, 69, 703, 706, 765, 793, 839 (Boettger, Schoenbein, Schoenn, Struve, Traube, Weltzien).

PERU BALSAM, test for alcohol, 245 (Gawalovskl).

PHOSPHORUS, 306, 682, 707, 858 (Hager, Scherer, Schoenn, Woehler).

PHYSOSTIGMIA, 606 (Petti).

PICROTOXIN, 187, 579 (Duflos, Palm).

PLATINUM, 208 (Fischer).

POTASSIUM SALTS, 142, 419, 587, 760 (Curtmann, Koninck, Mohr, Stolba).

POTASSIUM IODIDE, purity, 450 (Lepage).

PROTEIN, 655, 748 (Rithausen, Sonnenschein).

PTOMAINES, 95, 797 (Brouardel and Boutmy, Trotarelli).

PUS, 150 (Day).

QUINAMINA, 571 (Oudemans).

QUINIA, 9, 87, 226, 257, 323, 410, 442, 454, 492, 576, 598, 718, 758, 759, 819, 867 (André, Brandes, Flueckiger, Glénard, van Heijningen, Kletzinski, Leers, Leube, Maisch, Pagliari, Pelletier, Schwabe, Stoddart, Stokes, Vogel, Zeller). See also CINCHONA ALKALOIDS.

— purity, 306, 339, 406, 463, 667, 826, 870 (Hager, Hesse, Kerner, Liebig, Rump, de Vrij, Zimmer).

— test for morphia, 341, 388 (Hesse, Jassoy).— for salicin, 139 (Creuse).

QUINIDIA, purity, 342, 825, 870 (Hesse, de Vrij, Zimmer).

RESIN in wax, 168 (Donath).

RESINS, 353 (Hirschsohn).

RHODANATES (-ides), 71 (Boettger).

RHUBARB, test for turmeric, 370, 493, 564 (Howie, Maisch, Opwynda).

SAFRANIN, 70 (Boettger).

SALICIN in sulphate of quinia, 139 (Creuse).

SANTONINE, 471, 739 (Lindo, Smith).—test for strychnia, 309 (Hager).
 SCAMMONY, purity of resin, 104 (Buchner).
 SKLENIUM, 207 (Fischer).
 SILVER in lead ore, 428 (Krutwig).
 SODA (caustic) in carbonate of sodium, 544 (Mueller).
 SODIUM, BICARBONATE, test for monocarbonate, 49 (Biltz).
 SODIUM SALTS, 308, 768 (Hager, Streng).
 SOLANIN, 18, 173, 328 (Bach, Dragendorff, Helwig).
 STARCH in chocolate, 856 (Wittstein).—test for flour, 63 (Boettger).
 STEARINE in wax, 249 (Geith).
 STYCHNIA, 4, 94, 149, 174, 285, 368, 428, 444, 485, 490, 509, 725, 736, 840 (Allen, Brieger, Davy, Dragendorff, Hagen, Horsley, Landerer, Lefort, Mack, Marchand, Otto, Selmi, Slater, Wenzell).
 —in presence of morphia, 780 (Thomas).—in santonine, 309 (Hager).
 SUGAR, 604, 670, 804 (Pettenkofer, Runge, Vidau).—in glycerine, 310 (Hager).
 SULPHOCARBOLENES, 627 (Prescott).
 SULPHOCARBONATES, 536 (Mermet).
 SULPHOCYANIDES, 71 (Boettger).
 SULPHUR, 18, 102, 708, 828 (Bailey, Brunner, Schoenn, Vohl).—in illuminating gas, 880 (Wartha).
 SULPHURETTED HYDROGEN, 209 (Fischer).
 SWEET SPIRIT OF NITRE, test for aldehyde, 262 (Golding-Bird).—for water, 474 (Lloyd).
 TANNIN, 247, 274, 631, 890, 893 (Gayard, Griessmayer, Proctor, Vogel, Watson).
 —in wine, 120 (Carpené).
 TELLURIUM, 407 (Kerstel).
 TERPENE, 558 (Nobel).
 TEXTILE FIBRES, 88, 386, 573, 602, 693, 720 (Berthold, Jacquemin, Overbeck, Persoz, Schlossberger, Schweitzer).
 THIRINA, 781 (Thompson).
 THEOBROMINE, 794 (Treumann).
 THYMOL, 814, 812 (Hammarsten and Robberts, Vitali).—in menthol, 198 (Eyckmann).
 TIN, 183 (Dryer).—test for lead, 54, 227 (Bobierre, Fordos).
 TITANIUM, 377, 837 (Jackson, Weller).
 TURMERIC in rhubarb, 370, 498, 564 (Howie, Maisch, Opwyrd).
 URANIUM, 405 (Kern).
 UREA, 98, 533, 547, 687 (Bruecke, Miller, Musculus, Schiff).
 URINE in potable water, 443 (Leffmann).
 —test for albumen—see ALBUMEN.—for alcohol, 145 (Davy).—for carabolic acid, 170 (Dragendorff).—for copaiva and gurjun balsam, 558 (Nobel)—for glucose—see GLUCOSE.—for iodine, 317 (Harnack).—for mercury, 241 (Fuerbringer).
 VANADIUM, 838 (Weller).
 VERATRINA, 792, 842 (Trapp, Weppen).

VINEGAR, test for mineral acids, 35, 130, 287, 373, 397, 764, 844, 887 (Bergmann, Chiappe, Hager, Hume, Jorissen, Strohl, Wharton, Witz).

— test for free sulphuric acid, 159, 551, 616, 786, 823, 860 (Donath, Nessler, Pollacci, Thresh, Vogel, Wormley).

WATER, in absolute alcohol, 128, 132, 152, 495, 851 (Casoria, Claus, Debrunner, Mann, Winkler). — in ether, 62, 549, 661 (Boettger, Napier, Romef). — in essential oils, 455 (Leuchs). — in sweet spirit of nitre, 474 (Lloyd).

— test for iodine and bromine, 832 (Henry and Humbert).

— POTABLE, test for carbonic acid, 605 (Pettenkoffer). — for lead, 53 (Blyth). — for nitric acid, 65, 402, 644, 818 (Boettger, Kaemmerer, Reichardt, Vogel). — for nitrous acid, 402, 510, 702 (Kaemmerer, Maschke, Schoenbein). — for organic impurities, 93, 188 (Brautlecht, Dumasquier). — for suspended matter, 500 (Marchand). — for urine, 443 (Leffmann).

WAX, varieties, 854 (Hirschsohn).

— test for parafine, 480 (Landolt). — for resin, 163 (Donath). — for stearine, 249 (Geith).

WHEAT, oiled, 347 (Himly).

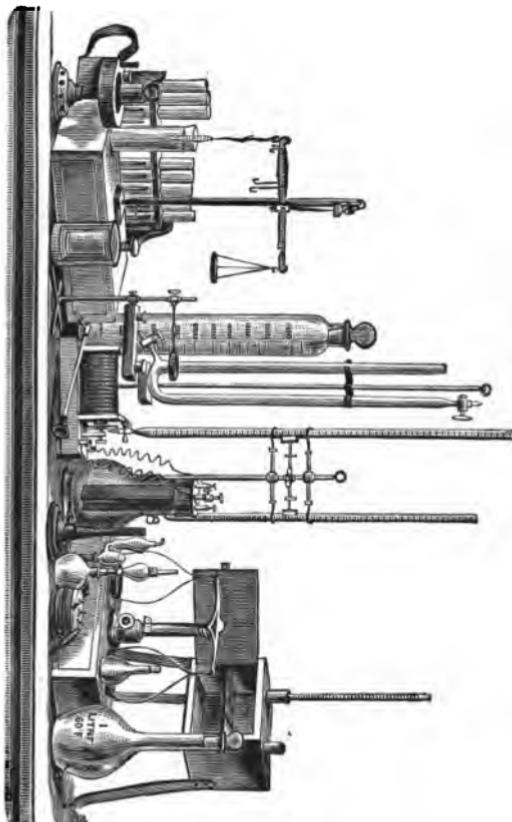
WINE, test for fuchsin, 125, 248, 587, 624 (Chancel, Geissler, Pasteur and Wurtz, Pradines). — for lead and copper, 310 *bis* (Hahnemann). — for salicylic acid, 782 (Sieboldt and Bradbury). — for sulphurous acid, 459 (Liebermann). — for tannin, 118 (Carpené). — for free taric acid, 552 (Nessler).

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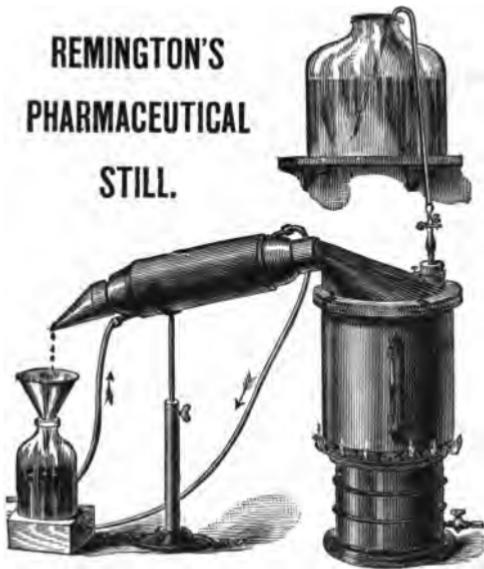
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State School of Mines, Golden, Col.
University of California, Berkeley, Cal.
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[Medical, dental, pharmaceutical, and veterinary schools not included.]

TABLE EXHIBITING THE DIFFERENCES OF STRENGTH OF
THE PREPARATIONS AS MADE ACCORDING TO THE
1870 AND THE PRESENT PHARMACOPÆIA.

NAME OF PREPARATION.	Number of parts of active constituent in 100 parts by weight of the preparation.	Phar. 1870.†	Phar. 1880.
Acetum Lobelieæ	13	10	
Acetum Opii	16.3	10	
Acetum Sanguinarieæ	13	10	
Acetum Scilleæ	13	10	
Acidum Aceticum	35	36	
Acidum Aceticum Dilutum	4.5	6	
Acidum Hydrochloricum Dilutum	7.8	10	
Acidum Nitricum Dilutum	11.6	10	
Acidum Phosphoricum Dilutum	9.8	10	
Acidum Sulphuricum	about 100	96	
Acidum Sulphuricum Dilutum	12.1	10	
Acidum Sulphurosum	about 6.4	3.5	
Alcohol Dilutum	39	45.5	
Confectio Sennæ	8.33	10	
Extractum Aconiti	Leaves	Root	
Extractum Conii Alcoholicum	Leaves	Fruit	
Ferri et Quininæ Citras	16 Quinine	12 Quinine	
Liquor Acidi Arseniosi	0.87	1	
Liquor Ferri Chloridi	35	39	
Liquor Potassæ	5.8	5	
Liquor Potassii Arsenitis	0.87	1	
Liquor Sodaæ	5.7	5	
Opii Pulvis	10 or over	12 to 16	
Opium	about 8	9 or over	
Opium Denarcotisatum	—	14	
Spiritus Anisi	6.8	10	
Spiritus Camphoræ	14	10	
Spiritus Cinnamomi	8	10	
Spiritus Juniperi	2	3	
Spiritus Lavandulæ	2	3	
Spiritus Menthe Piperite	6.4	10	
Spiritus Menthe Viridis	6.4	10	
Spiritus Myristice	2	3	
Tinctura Aconiti	47.6	40	
Tinctura Aloæ	8.3	10	
Tinctura Aloes et Myrrhæ	each 12	each 10	
Tinctura Arnicae Florum	23	20	
Tinctura Asafoetidæ	16	20	
Tinctura Calumbæ	15	10	
Tinctura Cannabis	86†	20	
Tinctura Cantharidis	8.5	5	
Tinctura Capaci	3.5	5	

TABLE EXHIBITING THE DIFFERENCES, ETC.—Continued.

NAME OF PREPARATION.	Number of parts of active constituent in 100 parts by weight of the preparation.	
	Phar. 1870.†	Phar. 1880.
Tinctura Catechu Composita.....	7	12
Tinctura Cinchonæ.....	25	20
Tinctura Conii.....	Leaves	Fruit
Tinctura Cubebæ.....	15	10
Tinctura Galæ.....	15	20
Tinctura Guaiaci.....	23	20
Tinctura Guaiaci Ammoniata.....	23	20
Tinctura Humuli.....	17.5	20
Tinctura Lobeliæ.....	15	20
Tinctura Myrræ.....	12	20
Tinctura Nucis Vomiceæ.....	3.5 or less §	2 §
Tinctura Opii 	9	10
Tinctura Opii Deodorata 	9	10
Tinctura Quassiae.....	6	10
Tinctura Rhei.....	10	12
Tinctura Serpentariae.....	15	10
Tinctura Stramonii.....	15	10
Tinctura Valerianæ.....	15	20
Tinctura Valerianæ Ammoniata.....	15	20
Tinctura Veratri Viridis.....	55	50
Tinctura Zingiberis.....	31.8	20
Unguentum Acidii Carbolici.....	12	10
Unguentum Acidii Tannici.....	6	10
Unguentum Belladonnæ.....	12	10
Unguentum Galæ.....	12	10
Unguentum Hydrarygi Ammoniati.....	8	10
Unguentum Hydrarygi Oxidi Flavi.....	8	10
Unguentum Stramonii.....	12	10
Unguentum Zinci Oxidi.....	16	20
Vinum Ergotæ.....	12.5	15
Vinum Opii.....	13	10
Vinum Rhei.....	14	10

* This table embraces all changes which can be considered sufficiently great to require notice, and all changes of above 1 per cent in the strength of preparations used internally. It does not note trifling changes in the composition of preparations intended for external use.

† For liquid galenical preparations, the figures in this column are only approximately correct, as the calculation into parts by weight involves the specific gravity, which is subject to considerable variation.

‡ In reality 6 of the Extract, which is equivalent to about 35 of dry *Cannabis Indica*. § Of dry extract.

! The actual morphine strength is increased nearly one half.